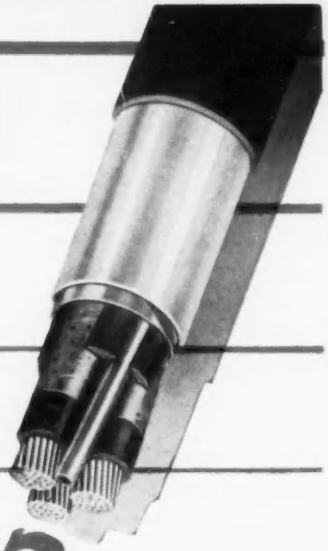
ELECTRICAL TIMES

THURSDAY
24 AUGUST
1950
SIXPENCE

ALUMINIUM SHEATHED IMPREGNATED PRESSURE CABLES FOR 33kV



BICC have now designed a 33kV 3-core Aluminium Sheathed Impregnated Pressure Cable which is lighter, cheaper, and smaller than the conventional lead sheathed type.

It is economical because the mechanical strength of the aluminium sheath is capable of withstanding the internal gas pressure of 200 lb. per square inch without reinforcement.

BICC are the first to produce a high voltage cable of this type.

For further information send for our publication No. 281W.

B.I. Callender's

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

A NEW ACE *in the Dealer's Hand*

A smart modern reflector fire, built for the discerning buyer, yet priced for the massed market . . . that is the ace we have up our sleeve for the coming season. Make your bid for business by placing your order now !

Model No.: F.103.

Colour: Cream and Black.

Loading: 2 kW.

Voltage ranges: 200/210, 220/230, 240/250.

Dimensions: 18in. wide by 16½in. high by 10 in. deep.

List Price: £5.10.0.
Purchase Tax £4.0.10½.

Please write for leaflet FE5, which gives full details.

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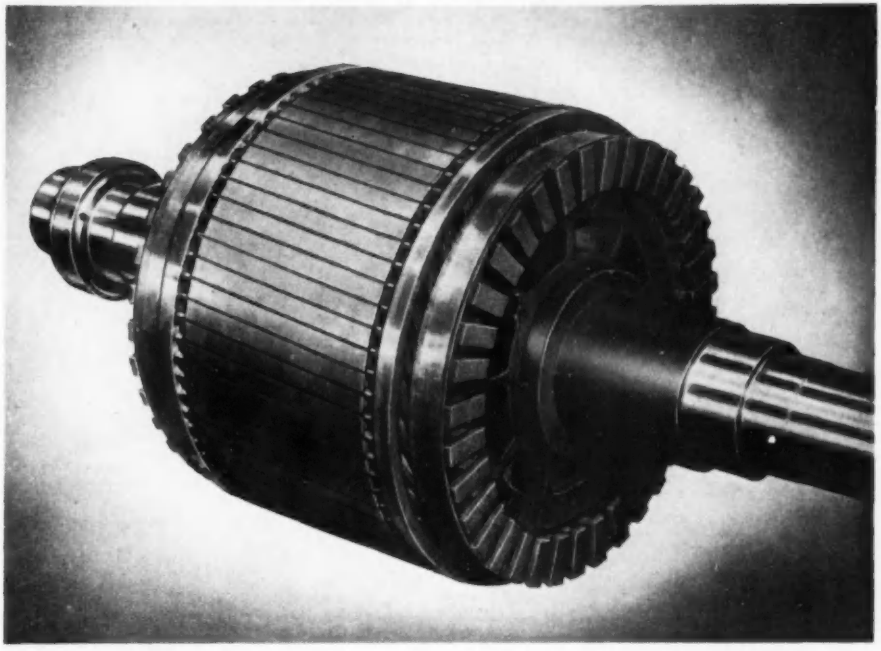
BRITISH NATIONAL ELECTRICS LTD.

The Domestic Appliances Section of JOHNSON & PHILLIPS LTD.

NEWARTHILL · MOTHERWELL · SCOTLAND.



A typical 'Trislot' rotor of medium-large size.

L.S.E.

TRISLOT

A squirrel cage motor of special design, giving a higher starting torque for a lower starting current than a standard squirrel cage machine, combined with high running efficiency.

Suitable for all high torque applications and for use in many instances instead of the more expensive slip-ring installation.

One example of the comprehensive range of machines made by the specialists :

LAURENCE, SCOTT
& ELECTROMOTORS LTD

NORWICH · MANCHESTER · LONDON & BRANCHES

A

"Off the shelf service" at ten points
FOR ALL 'REYROLLE' FITTINGS

One of the many coupling arrangements in the 'Reyrolle' range of Metalclad Fittings for Industrial Service.

Nearly 200 different types and sizes, covering every possible requirement, are available.

Admiralty types: Flameproof: Electric Vehicle Charging: Heavy Duty for Dock Work: Switch & Switch/fuse plugs etc.

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2 pole & 3 pole
with scraping earth connections

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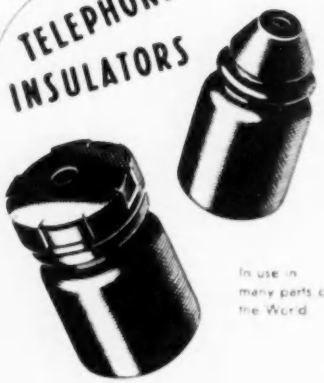

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PLASTIC MOULDERS
FOR NEARLY 50 YEARS
Litholite Insulators & St. Albans Mouldings Ltd., Sandown Rd., Watford
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THE STEEL COVERED HEATER WITH

USES

IN its variety of forms, the Cressall steel jacketed unit heater is the solution to most heating problems. Let a Cressall Technical discuss Expert heating with you before you decide. He will be happy to help.

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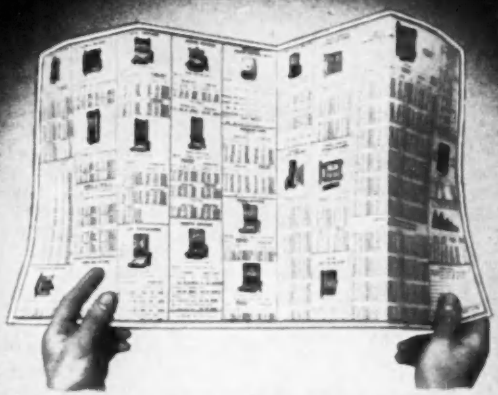

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SWITCH AND DISTRIBUTION GEAR

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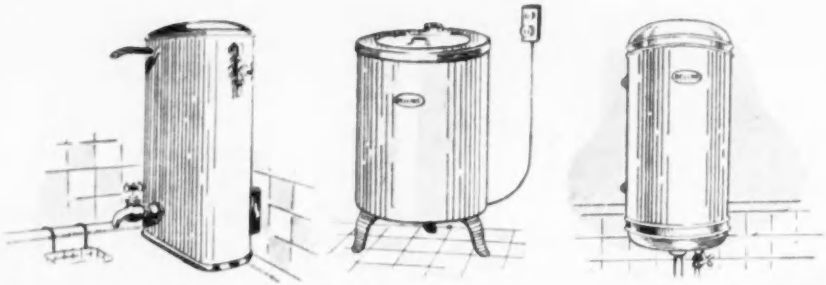


1912 *The Story of* BELLING *& Company Ltd.* No. II 1950

In the last chapter I mentioned we had got out several new designs amongst which was our first reflector type fire. We also designed a special hotel fire which we supplied to, amongst others, The Royal Bath, Bournemouth; The King's Hotel, Brighton; Park Gates Hotel, Eastbourne, and The Palace Hotel, Torquay.

I nearly forgot to mention our first big order for fires was from the Regent Palace Hotel, London, who had nearly 1,000 installed in their bedrooms.

By 1925 we were getting well settled down in Enfield and our output of fires was beginning to rise rapidly. In the same year I took out a patent for our "Honeycomb" boiler griller. This consisted of a strong slab of fireclay with horizontal holes into which the spiral was fitted, and vertical holes on the under side to let the heat downwards, just like an ordinary honeycomb. It was very successful from an efficiency point of view but was later replaced by our cast iron boiler griller which was stronger mechanically.

It seems, from the list of patents, I took one out almost every six months, but a lot of them faded out in time. Also in 1925 we built three more bays, about 12,000 sq. ft., which we fitted out as a new foundry for ourselves. This became essential owing to the number of castings which we wanted for cookers and fires. Our foundry today is about four times its original size and we shall have to extend it still further shortly.

We have been told that we produce the best castings in the South of England and we have to keep our quality right up to the mark to avoid losses in the vitreous enamelling processes which follow.

In our next catalogue for 1926/7, we illustrated a wash boiler, a storage heater and a bath water heater on pages 61, 62 and 63. I don't suppose you have any of our old catalogues so I have reproduced the illustrations at the top of this page. You will see that they are almost identical in design with those on the market today. However, most of these lines we had to drop so that we could keep pace with our orders for fires.

Also in 1926 we added another line to our catalogue, namely Pipe Heaters. In addition we made "electric" hotwater radiators by fitting immersion heaters to existing cast iron designs. Having our own foundry we commenced making round cast iron boiling plates for which I took out another patent. Our boilers today, which we make in very large quantities, have a great reputation for their extremely long life and freedom from flaking and pitting.

In the same year we built and opened our own Works Canteen (long before these became compulsory), about 3,500 sq. ft., where all the cooking appliances we made were very vigorously tested. Some ideas of mine didn't last a week! The Canteen was a splendid "Testing House" for this purpose. In December 1925 Bakelite was coming into prominence for switch parts and wireless accessories. Mr. Arnold, Mr. Lee and myself, who all began using it, decided to form a separate limited company, Insulators Limited, to produce the various parts we wanted. This concern grew rapidly and is now one of the leading firms of Trade Moulders with a second works at Jarrow. Mr. Waghorne, who has been with us twenty-one years, is our Technical Director. He has been in plastics since the very early days, is known by everyone in the Plastics Industry and has twice been elected Chairman of the British Plastics Federation. Our secondary works at Jarrow, designed and equipped by him, are probably the most up-to-date and efficient in the country.

In 1927 we put up three more bays about 12,000 sq. ft. These were for vitreous enamelling ovens and to make a start on producing our own fireclay bars and parts, which processes I shall be referring to again later on.

C. R. Belling.

Belling & Co. Ltd., Bridge Works, Enfield, Middx. Tel: Howard 1212

CRCII

HENLEY *Modern*

DISTRIBUTION PILLARS AND PANELS

GROUP 24

Designed by engineers of experience

Embodied in the new HENLEY Distribution Pillars are all those features that keen distribution engineers are looking for, together with a shell of modern pleasing appearance.

Robust cast-iron construction throughout with detachable plinth and roof.

Adequate provision for ventilation.

One-piece insulating right-angle type shields acting as phase barriers and vertical front shields for busbars.

Four sizes of Units are available, 200 to 1,000 amp, suitable for 3-phase 4-wire systems with cartridge fuse-link protection up to 60 amp for fifth core, if required. Units for other systems can be supplied.

One-piece insulators with specially designed entry to facilitate insertion or removal of conductor fittings.

Conductor fittings are reversible and interchangeable. Crossing of conductor cores is avoided.

Height 3′ 11″ above ground. Depth 14½″.

Enquiries invited. Please ask for Folder 24 A.

A 300-amp Unit for 3-phase 4-wire system fitted with Wedge Type Fuse-links on phases. Link on neutral and Cartridge Fuse-link on 5th core.

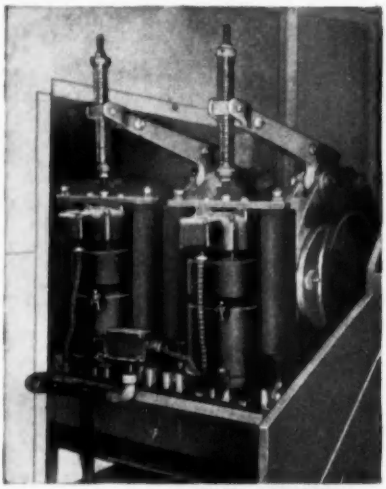
W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

Outstanding Improvement in Load Handling

B T-H

STACREEP CONTROL

using STANDARD AC MOTORS

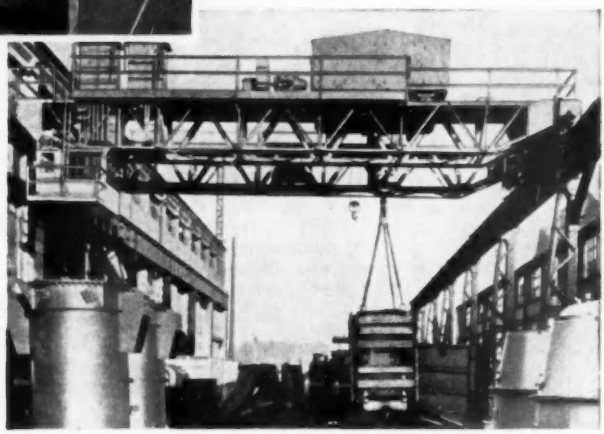


This BTH *(STABLE AC CREEP)* patented system of control, which employs a thrustor-operated brake, enables stable creeping speeds to be obtained with ordinary wound-rotor induction motors.

Whilst being of primary importance on hoist motions such as crane hoists, skip hoists, and winding gear, it can also be applied where fine control is required on such motions as crane traversing, travelling, luffing, and slewing.

For full description ask for List 2734-11

Thrustor and brake mechanism.



Crane fitted with "Stacreep" control.

THE

BRITISH THOMSON-HOUSTON

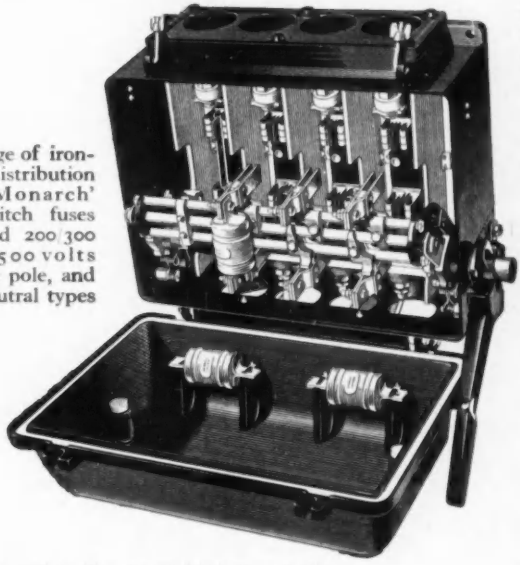
COMPANY LIMITED, RUGBY, ENGLAND

A41P

THIS IS A

Monarch

SWITCH-FUSE



The Simplex range of iron-clad switch and distribution gear includes 'Monarch' switches and switch fuses 100/150 amp. and 200/300 amp. capacity, 500 volts double pole, triple pole, and triple pole and neutral types

MADE BY THE HOUSE OF

Simplex

Simplex Electric Company Limited
Oldbury Birmingham and Branches

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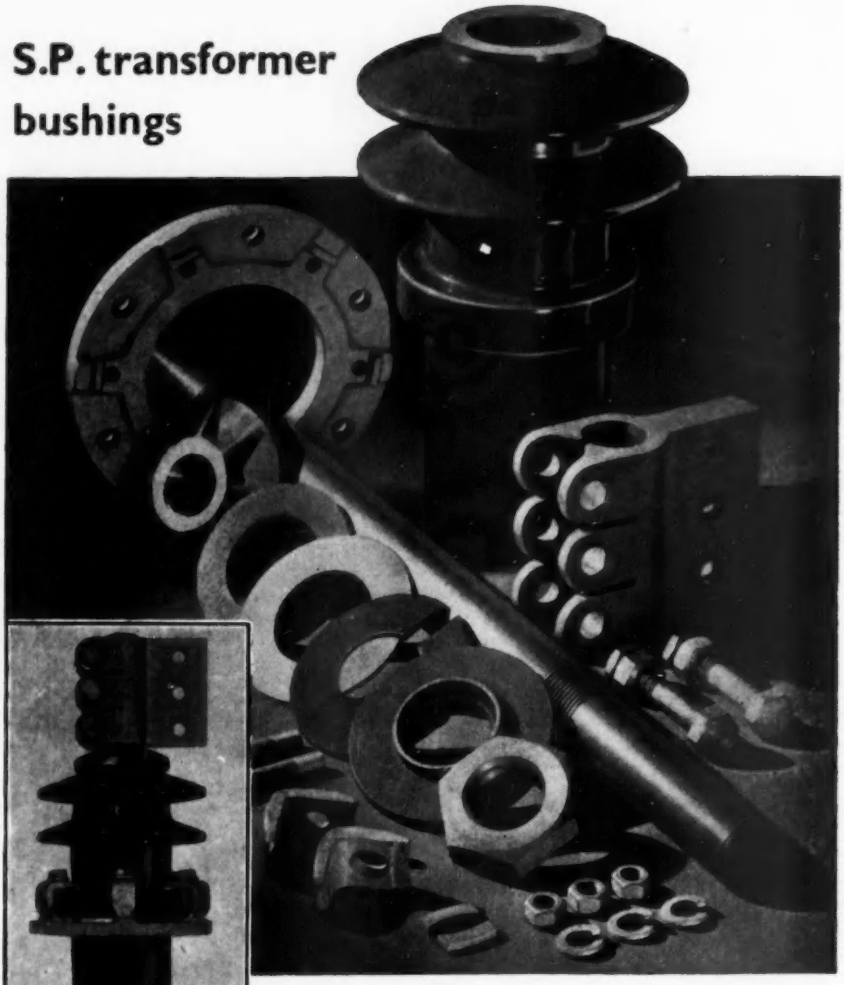
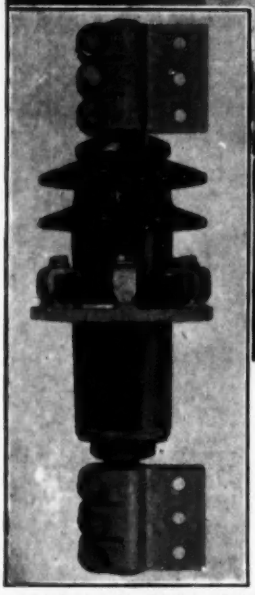
S.P. transformer bushings





Some of the components of a 6.6kV 1500 amp. bushing.

By the use of a complete range of interchangeable parts, standard bushings can be made up promptly for voltages from 600 volts to 88kV.

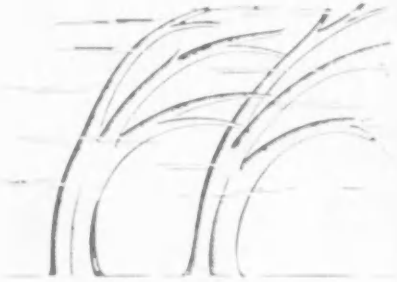
Current ratings from 150 to 1500 amps.

STEATITE AND PORCELAIN PRODUCTS LIMITED

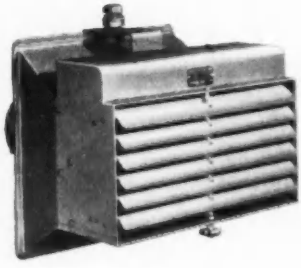
Stourport on Severn, Worcs. Tel: Stourport 111. 'Grams: Steatain, Stourport

S.P.45

It's an ill wind . . .



that slows production



Maintenance of even normal production during the winter months is difficult — peak production almost impossible — without a well planned system of space heating in the factory.

The thoughtful works manager chooses the system which needs no boilers, no handling or storage of fuel ; the system that eliminates the need for floor space and constant attention.

He chooses G.E.C. ELECTRIC UNIT HEATERS.

The Industrial Heating Department of the G.E.C. maintains a comprehensive planning and advisory service which is available at all times for consultation.

ELECTRIC UNIT HEATERS BY G.E.C.

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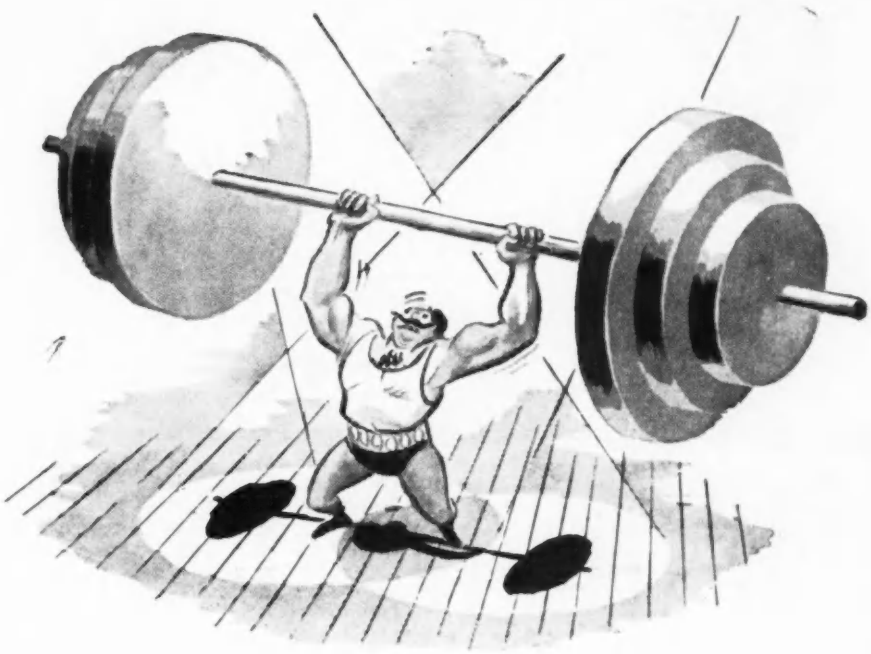
HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD., WALTON-ON-THAMES, SURREY

Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric," Walton-on-Thames



. . . but when it comes to electricity,

in the most modern mines of Britain and the World

Britannic Cables carry the load . . .

Britannic Cables' name was made with Power and Mining cables. Now there is also a full range of Britannic Rubber covered cables in sizes to suit every domestic and light industrial need. Ask your usual wholesalers for details or write direct to us. We are an independent firm and our prices, which are highly competitive, will please you.

Britannic Cables

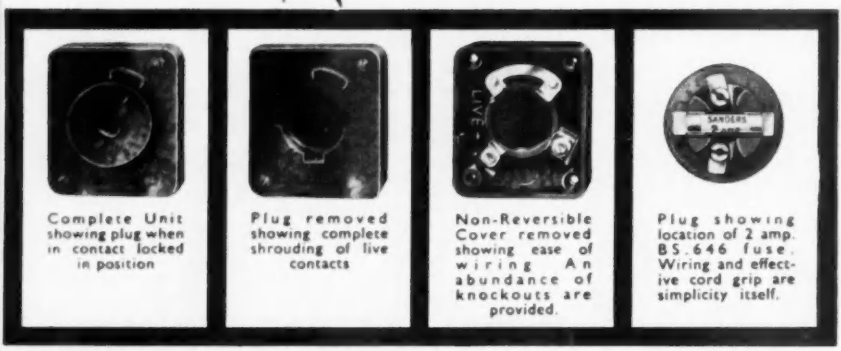
● BRITANNIC ELECTRIC CABLE & CONSTRUCTION CO LTD · IVER · BUCKS

An independent company

475,157 CONNECTORS

SANDERS CLOCK

Where all these are used and who uses them is a question we are not competent to answer, but we do know that our Authorised Distributors require substantial stocks to meet the daily demand, Sanders Clock Connectors being called for almost exclusively. The reasons for their popularity are not far to seek, for the exclusive patented design combining such ease of wiring and functional efficiency within so neat and compact a compass, provides everything required in an accessory of this nature.

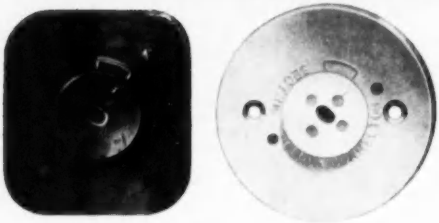


Complete Unit showing plug when in contact locked in position

Plug removed showing complete shrouding of live contacts

Non-Reversible Cover removed showing ease of wiring. An abundance of knockouts are provided.

Plug showing location of 2 amp. BS.646 fuse. Wiring and effective cord grip are simplicity itself.



Comprehensive stocks are carried by selected wholesalers in all large centres of population

List No.	Description	Approximate Dimensions	List Price
TA/OF 22	Square, surface (Walnut)	1¾" x 2⅛" x ⅞" projection	per doz. *26/4
KD/OF 22	Square, flush (Walnut)	2⅞" x 2⅛" x ½" projection	*29/4
BKD/OF 22	Circular, sunk for use with standard BS.31 or BS.820 boxes (White)	3⅛" diam. x ½" projection	*32/–

*Plus 110% advance

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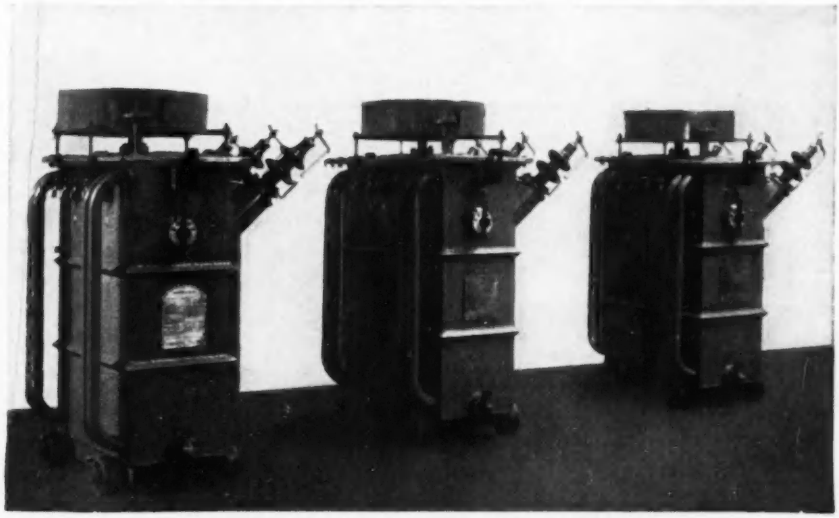
WEDNESBURY

WM. SANDERS & CO. (WEDNESBURY) LTD., WEDNESBURY, STAFFS.

HERMETICALLY SEALED!

Thompson Relief Chamber (Patented)



Part of a Contract for 72-100 KVA Transformers for Southern Rhodesia.

Designed to give

trouble-free service under damp and humid conditions, this type of unit is operating perfectly in India, East and West Africa, Malaya, Ceylon, etc.

NO MOISTURE or ACIDITY of OIL
NO SLUDGING of OIL
NO SERVICE COSTS

STANDARD TRANSFORMERS UP TO 2,000 KVA ALSO SUPPLIED

Apply for Brochure to—

THE LINDLEY THOMPSON
TRANSFORMER & SERVICE CO. LTD
ST. MARY'S ROAD, SLOUGH, BUCKS.
LANGLEY (BUCKS) 200-201

SIEMENS

ALL-INSULATED

CONSUMER'S SERVICE UNIT

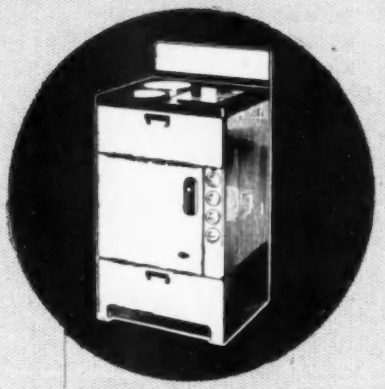
TYPE F3081

Arranged for two Meter Services

Fuse bus-bar is split for Lighting and Power Circuits each separately switched.

Catalogue No. Z170 sent on application

Advt. of SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED, 38/39 Upper Thames Street, London, E.C.4
Branches at Belfast Birmingham Bristol Cardiff Dublin Glasgow Leeds Liverpool Manchester Newcastle-on-Tyne Nottingham Sheffield



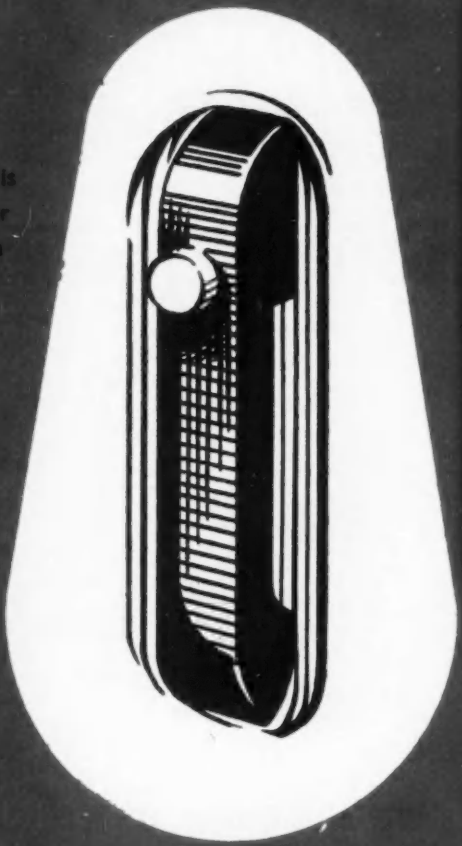
What's cooking?

Is it a cake? — Anything that's likely to suffer from harm through the banging of the oven door? — THEN the *Parnall Magnetic Catch* is the only satisfactory answer!

PARNALL POINTS OF PERFECTION

Magnetic Door Catch.

The patent Parnall Magnetic Door Catch is strong, positive in action and avoids door slamming or oven jarring. It consists of a permanent magnet of Alnico (alum-nickel-cobalt) a new material of great strength and true permanence. The magnet engages a spring-loaded keeper in the door which it holds with a pressure of 6lbs., and is operated by merely pressing the red button, which is conveniently fitted in the door handle. This magnetic catch is exclusive to the Parnall cooker. A similar catch is used on the hot-cupboard door.



PARNALL

PARNALL (YATE) LIMITED • 43 PARK STREET • LONDON • W1

Cost A LITTLE MORE *Last* A LOT LONGER

It is true that PYRAMID cost a little more than ordinary aluminium utensils, but then, there never was anything quite the equal of PYRAMID aluminium ware for hotplate cooking. PYRAMID utensils are specially manufactured with quarter inch thick bottoms; they are solid drawn in steel dies, and their thickness and quality cannot vary. They are scientifically ground by a special process to give a dead flat surface and are so constructed that distortion is avoided. Consequently, PYRAMID utensils continue to give "all over" contact with the hotplate, and so save electricity, for years after their cost has been forgotten.

PYRAMID

ALUMINIUM WARE

HAGUE & McKENZIE LTD., PYRAMID WORKS, BIRMINGHAM

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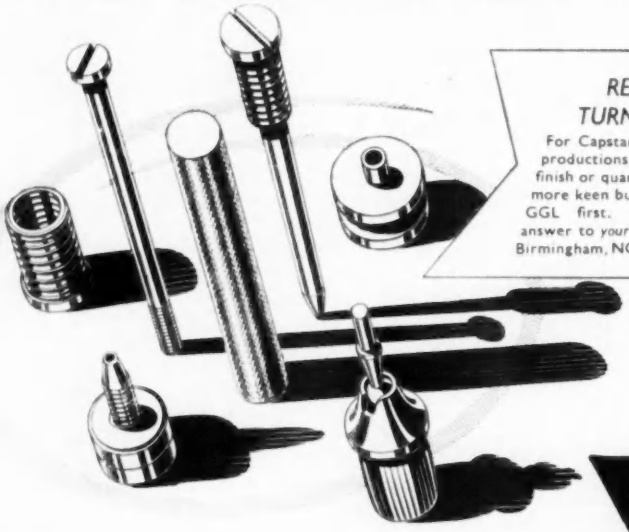

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For Capstan and Automatic productions in any metal or finish or quantity. More and more keen buyers are asking GGL first. For a quick answer to your problem ring Birmingham, NORthern 2132.

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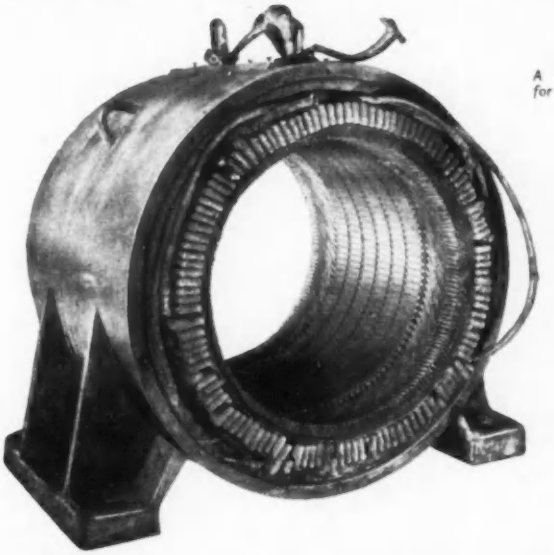
EMPIRE WORKS · PARK ROAD · BIRMINGHAM, 18

HAVE YOU ANY?



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If you have old and disused motors lying around your factory, modernise them to use as standby plant.

BROOK MOTORS
REPAIR DEPARTMENT

repair and rewind your damaged machines.

QUICKLY · EFFICIENTLY · AT LOW COST

Induction Repulsion or Commutator motors of all makes. A.C. or D.C.

Fifty motors are repaired every day

EMPRESS WORKS BROOK MOTORS Ltd HUDDERSFIELD

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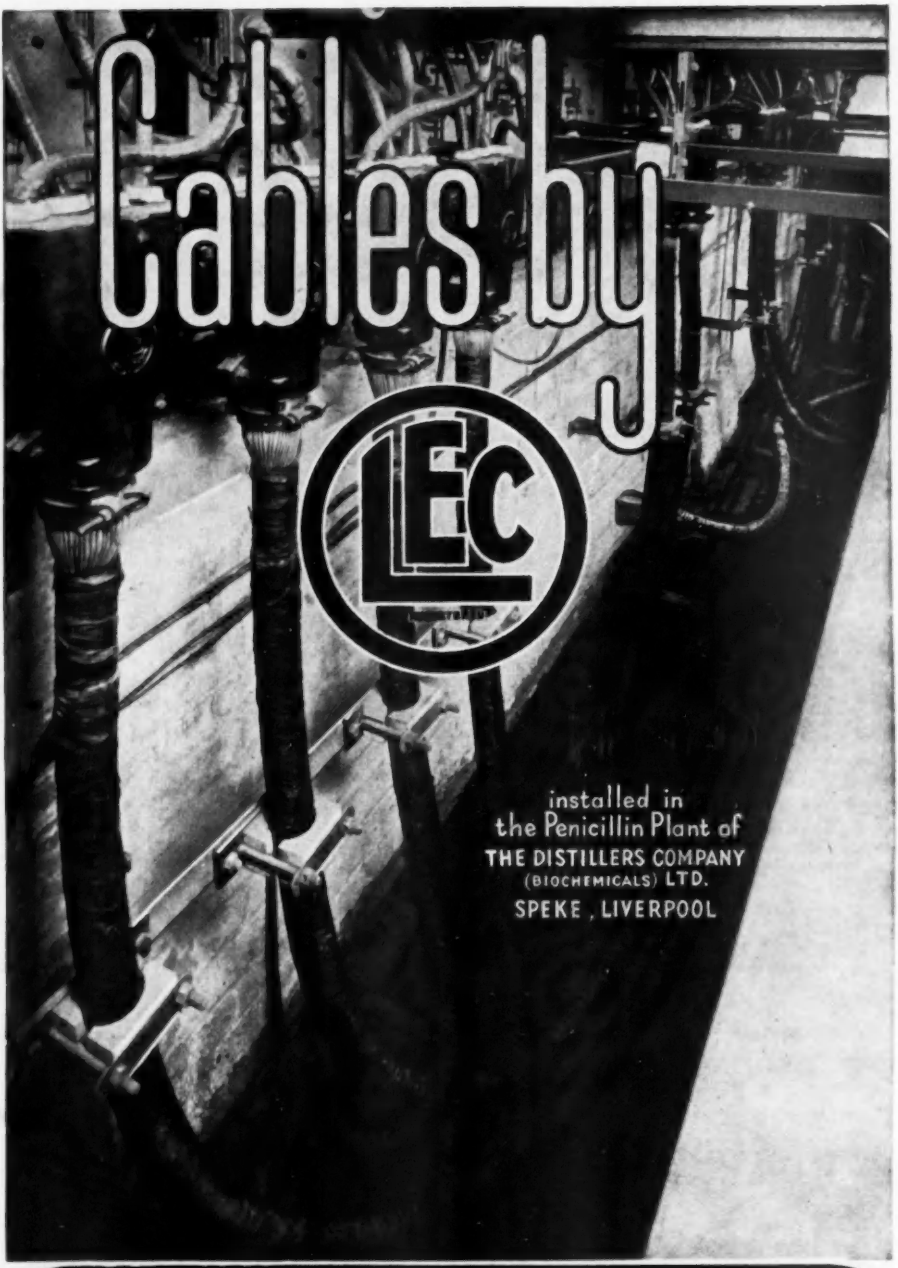
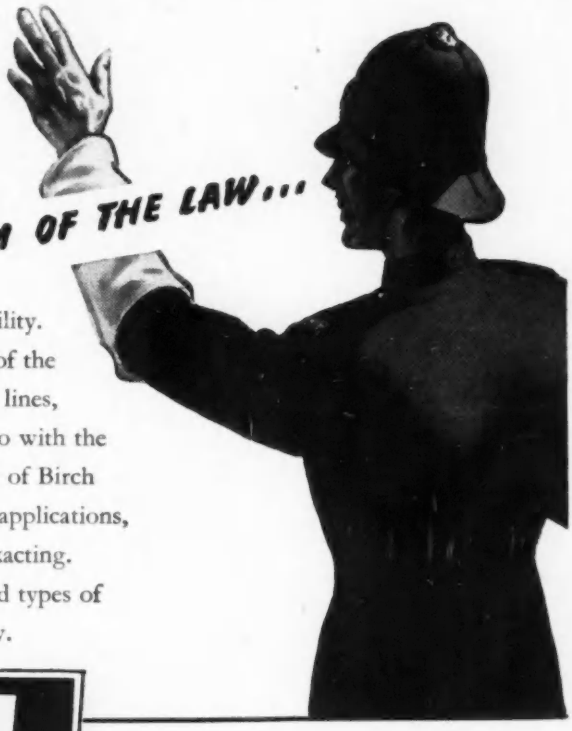


THE LIVERPOOL ELECTRIC CABLE CO., LTD.
LINACRE LANE, BOOTLE, LIVERPOOL, 20.
Associated with The London Electric Wire Company and Smiths, Limited. Frederick Smith and Company and Vactite Wire Company, Ltd.

"P. C. BIRCH"

ready for any 'Resistance' . . .



and famous for his Reliability. Like the proverbial 'arm of the law' he is built on robust lines, which has quite a lot to do with the amazing life and efficiency of Birch Resistances in their many applications, so various and often so exacting. Note the range of standard types of Resistances outlined below.

Birch *Resistances*

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DIMMERS—REGULATORS (Field, Shunt, Voltage)
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RHEOSTATS—ELEMENTS and SPIRALS
ASBESTOS WOVEN Resistance Nets and Grids

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All Resistance problems come within our scope. Please call on us to help you solve any problem which may arise.

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Telegrams: "WILOHM" Willenhall. Telephone: Willenhall 494-495
London Office: 33, Sudbury Court Road, Harrow. Tel.: ARNold 2694

B.R.2

As far as the eye can see . . .

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'SOL-ETERN'

STREET LIGHTING FITTINGS

Cardiff's Civic Centre is now illuminated by Revo "SOL-ETERN" lanterns each using two 80-watt fluorescent lamps, and the above photograph illustrates the splendid results obtained by what has been rightly described as one of the finest installations of its kind

Revo "SOL-ETERN" lanterns for Group A roads are made for use with 2, 3 or 4 80-watt 5 ft. fluorescent lamps, and the "Baby SOL-ETERN" for Group B roads takes 2 20-watt or 2 40-watt lamps.

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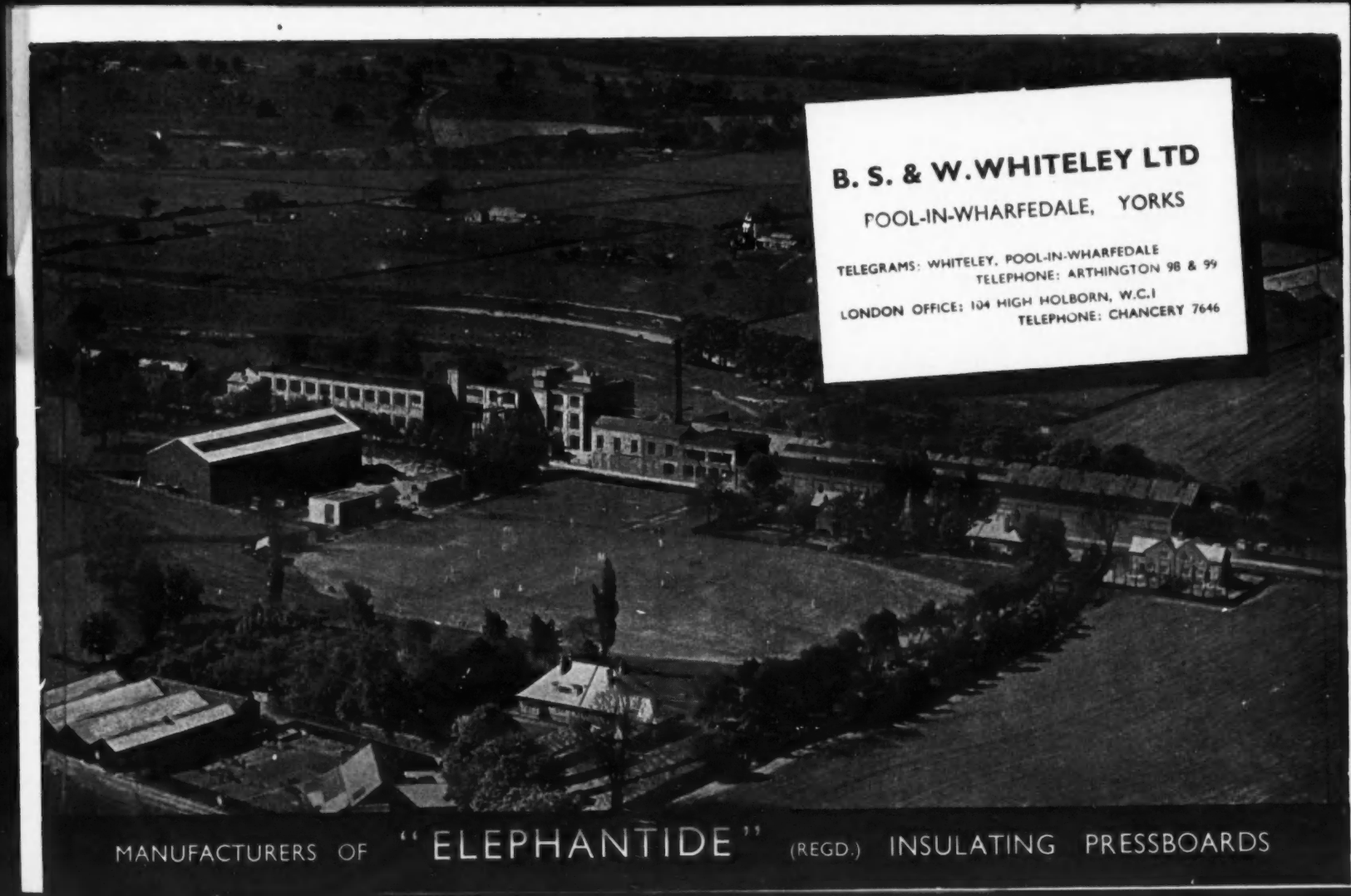
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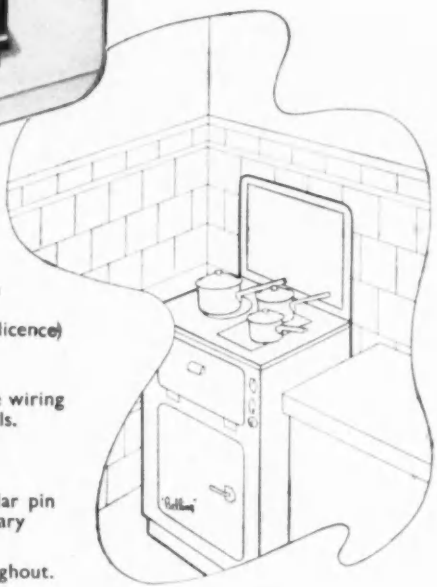
MANUFACTURERS OF "ELEPHANTIDE" (REGD.) INSULATING PRESSBOARDS

Modern design in

COOKER CONTROL UNITS



- ★ Attractively finished in durable cream enamel in harmony with modern Electric cookers.
- ★ *Seamless* case and lid both drawn from rust-resisting zinc-coated Zintec steel. Bonderized (under licence) prior to high temperature stove enamelling.
- ★ Chassis mounted interior—ample wiring space and three earthing terminals.
- ★ Main and auxiliary switches *both* self-indicating.
- ★ Round pin (BS 546) or rectangular pin (BS1362) socket-outlets for auxiliary circuit.
- ★ Non-track Urea mouldings throughout.

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A.27

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BRITISH PATENT NOS. 627815 & 627793

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...IN TRENCHES

The inherent tensile strength of aluminium permits J. & P. Aluminium Sheathed Cables to be laid in open trenches by a simple method which frequently offers a saving in labour.

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blackbirds baked

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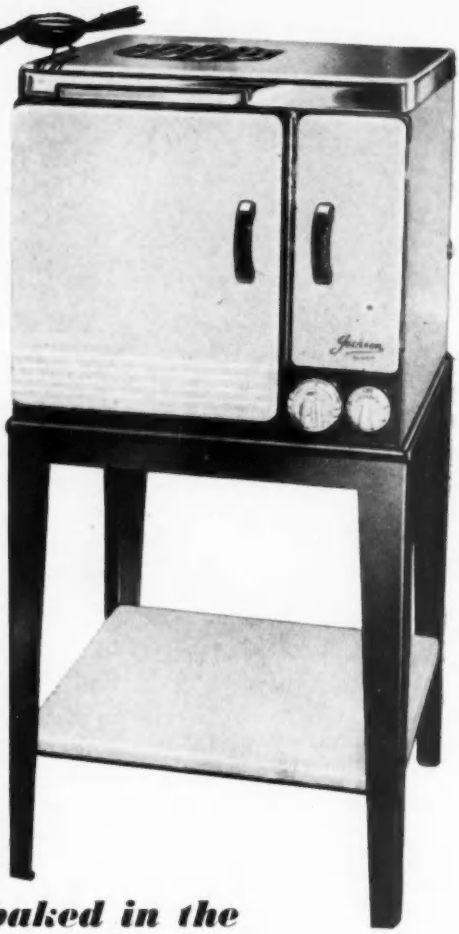

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tastier for being baked in the

'GIANT' *that Jackson* built

Self-contained oven controlled by Thermostat · Independent Radiant Plate with 'Simmerstat' · Efficient Grill · Spacious Hotcupboard · It can be connected to a power point (13 amp.) · Interchangeable saucepan shelf which forms a hob when the cooker is not in use.

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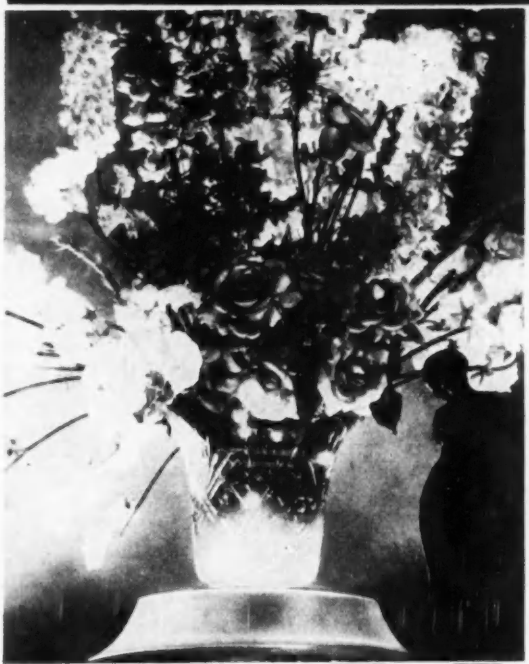

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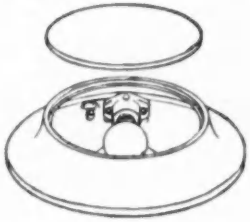

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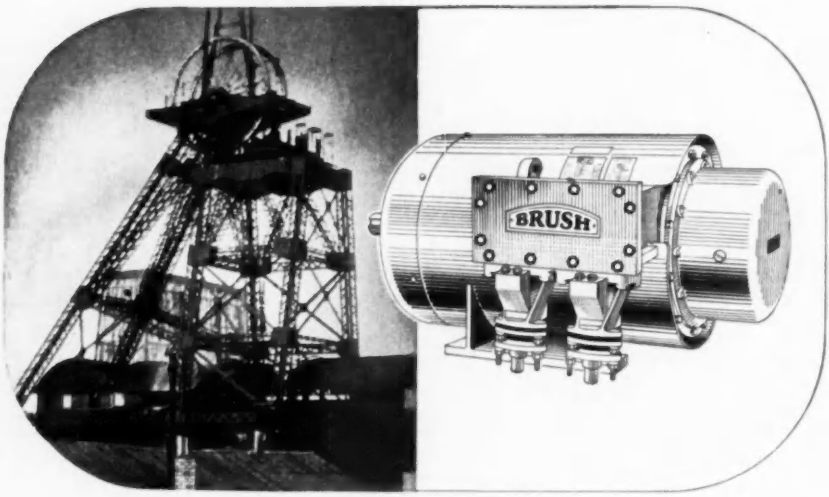

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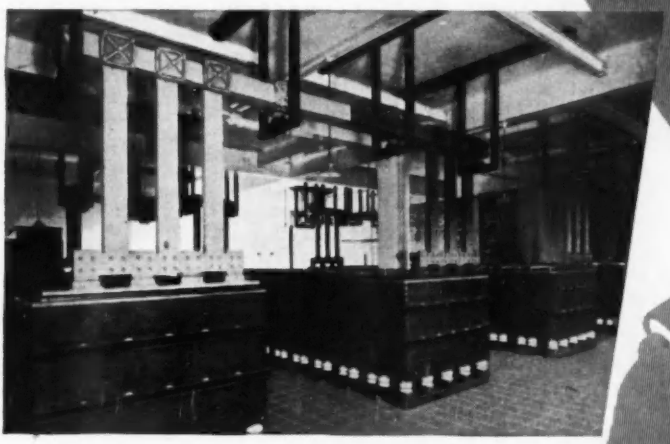
in the public service



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WE HAVE THESE

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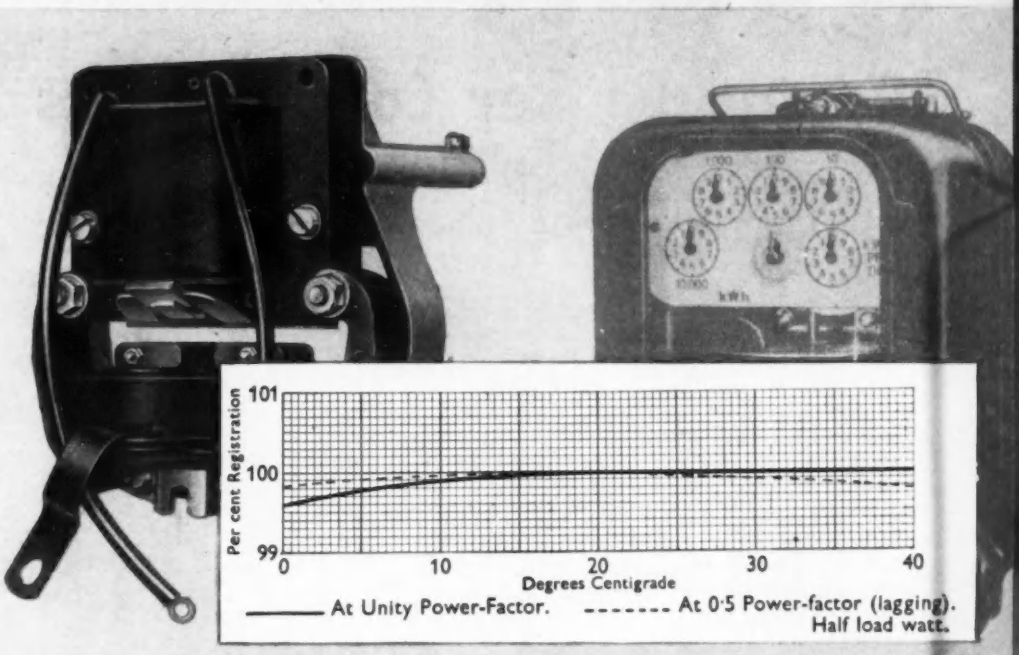
Meticulous Metering

by the METROVICK TYPE NF Watt-hour Meter



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30 Amp. Cooker Control Units

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EASTERN AVENUE, WOODFORD Lancaster fittings, 400 watt horizontal Mercury lamps — demonstrating planned controlled cut-off lighting, even distribution, good definition of objects and kerb.

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We started moulding meter covers for this Company in 1932. Ever since we have handled the job to their satisfaction. That is **EXPERIENCE.**

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In playing our part we have helped the manufacturers to play theirs — a joint effort, typical of our relationship with our customers. That is **CO-OPERATION.**

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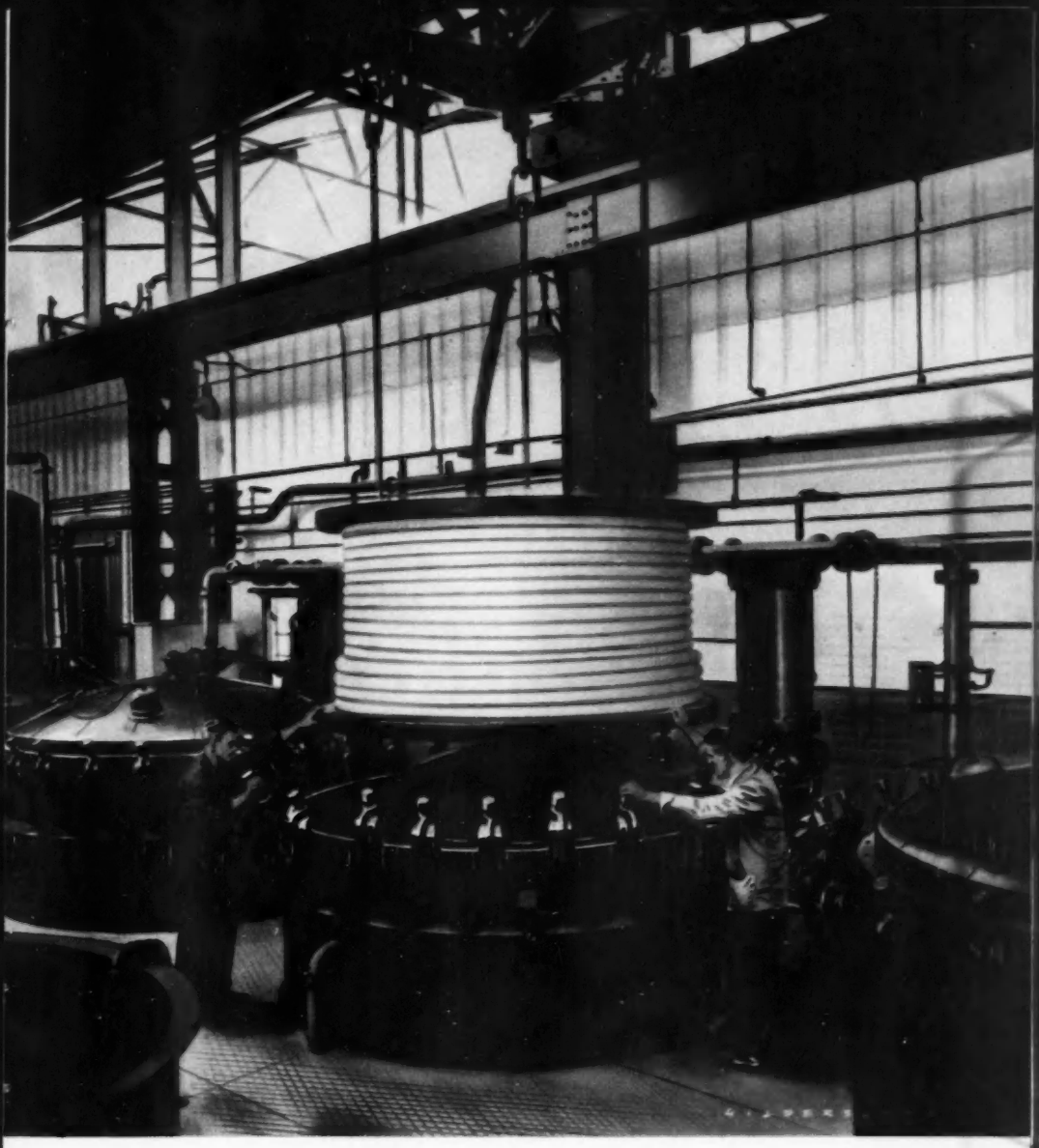
THE STREETLY MANUFACTURING CO. LTD., STREETLY, SUTTON COLDFIELD, Near BIRMINGHAM. 'Phone: Streetly 7311. 'Grams: Bang, Streetly.

B·I·P GROUP



Further outlook — complete impregnation . . .

Here's what's in store for this drum of Crompton cable—first de-aeration, then dehydration under vacuum, then impregnation under pressure. This is why Crompton cable always maintains its excellent electrical properties.

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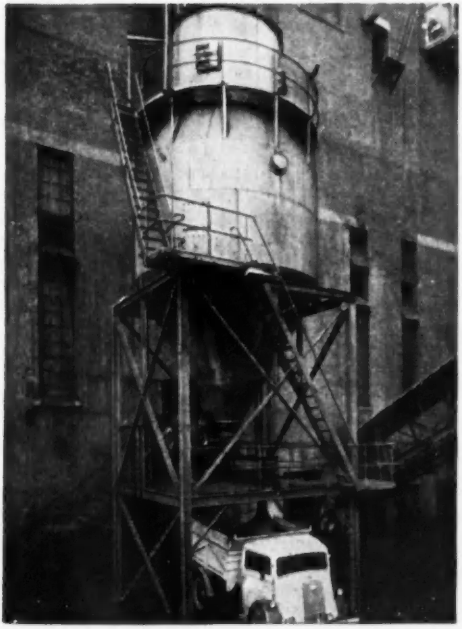
THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

FLUE DUST AND RIDDLINGS

EXTRACTION PLANT



● The Nation's need demands that Coal shall convert every possible fraction of its energy into power for production. The vital contribution that efficient combustion makes to this end is immeasurably facilitated by B.V.C. Flue Dust Removal Plant. This is the recognised method of keeping steam boilers free from accumulations of flue dust, and ensuring that every ton of coal is used to the best possible advantage by removing and consuming the riddlings.

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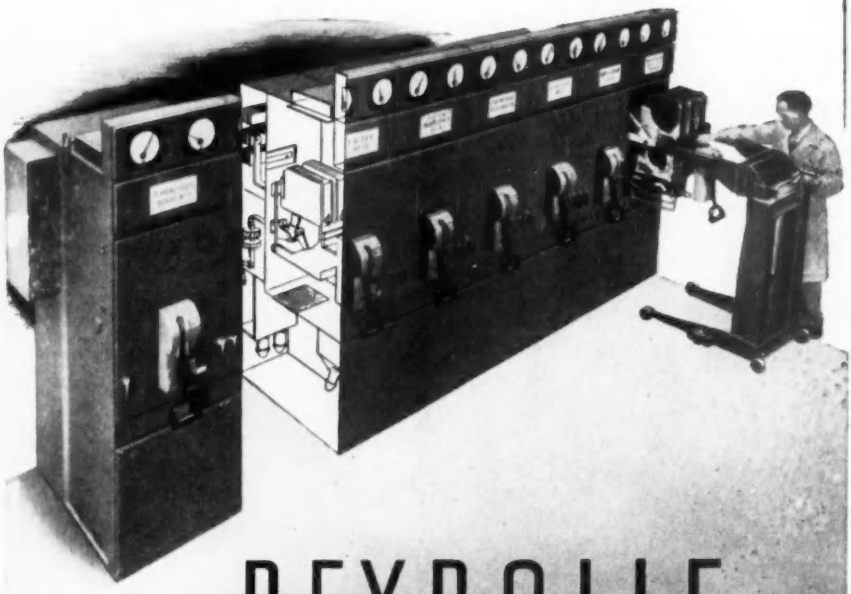
B

AIR-BREAK

CLASS-SA SWITCHGEAR

★ Air-insulated
★ Metal-enclosed
★ Medium-voltage
★ 800, 1200, 1600 and 2400 Amperes



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HEBBURN ★ CO. DURHAM ★ ENGLAND

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Duravires
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Duracables

(P.V.C. Insulated)

are made to stand criticism

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FELTHAM *Telephone: Feltham 3453-6* **MIDDLESEX**

JOVE
AND HIS LIGHTNINGS

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Olympian might made visible to mortal man, that he may know the majesty and awful wrath of gods.

In Greek mythology and Saxon song, in warlike sagas of the Norse, in mystic legends of Valhalla and northern Rhine, the lightning's flash illumes the fury of the Gods . . .

So down the ages until man, outpacing superstition through science, strikes the spark—and in the bare passage of a century, transforms titanic omnipotence to a trained servant, obsequious behind a thin wall of white porcelain.

TAYLOR, TUNNICLIFF PORCELAIN

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for Quality
Performance

The FERRANTI FM METER

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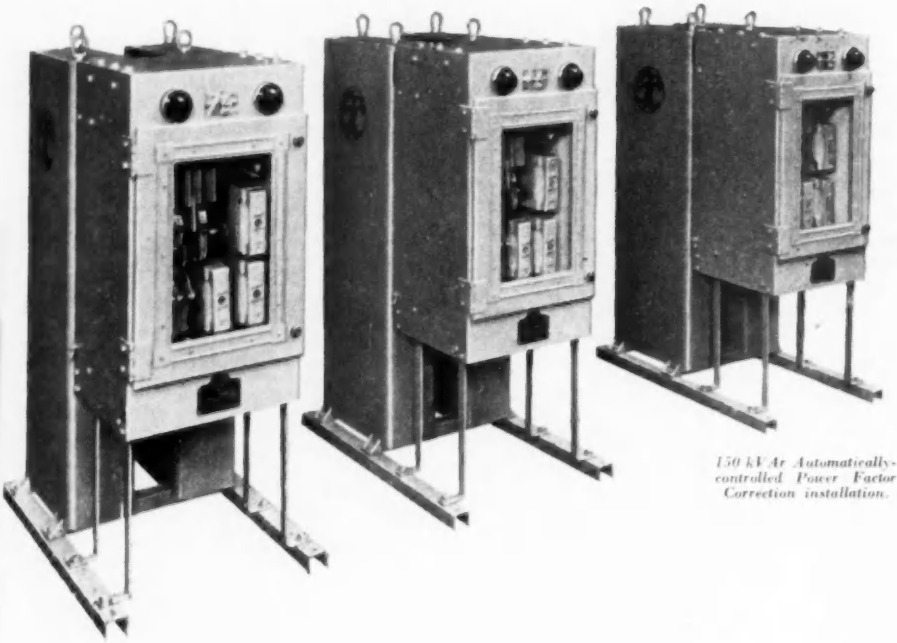

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Well adapted to automatic control, ***Standard*** Power Factor Correction Capacitors are simple in operation and low in first cost.

To those considering the power factor correction of electrical plant the advice of ***Standard*** engineers is available. Without charge, without obligation and without delay a visit can be arranged, load conditions investigated, and an estimate prepared.

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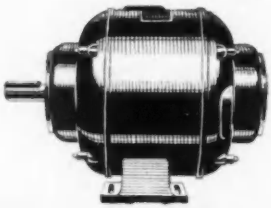
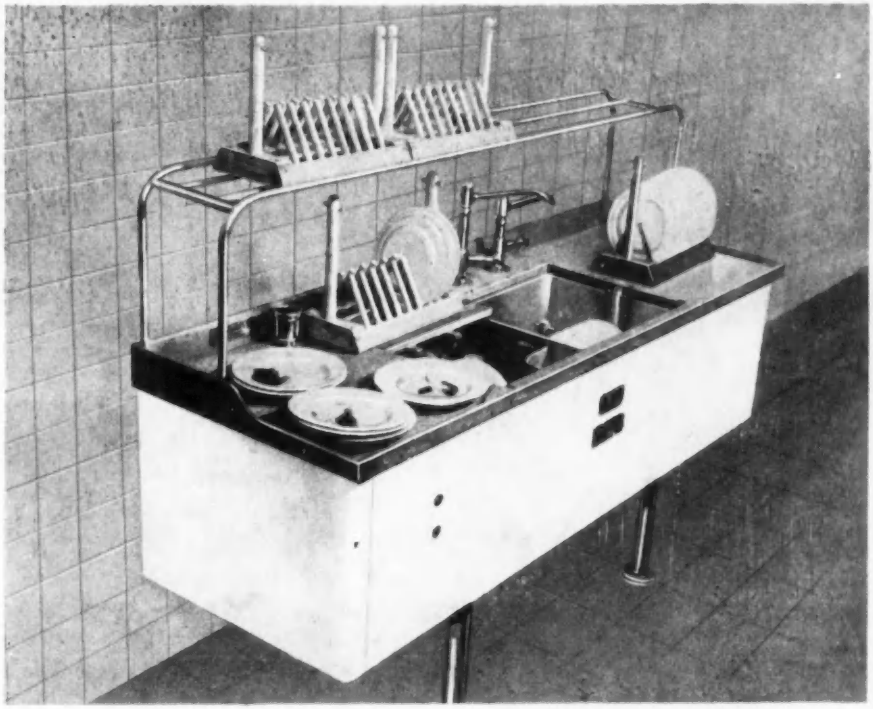
POWER LINE DIVISION (Department 2440), NORTH WOOLWICH, LONDON, E.16. Telephone : Albert Dock 1401 (Ext. 796).



Who does the washing up?



The answer in this case is the 'Splendid' Staines Dish Washer, made by Staines Kitchen Equipment Ltd. And the fractional chosen to power this modern appliance is a Crompton 'Minor'. This motor has many features to commend it for kitchen duties. Its electrical and mechanical design is carefully balanced to ensure quiet running and it has to pass a stringent Silence Room test. The 'Marathon' sleeve bearing is filled with oil when the motor is built and allows two years continuous running without additional lubrication. There is a suitable Crompton 'Minor' motor for every fractional drive.

"MINOR" MOTORS—
ONE OF THE PRODUCTS OF THE PLANT DIVISION
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POWER *in plenty!*

TILLING-STEVENS Motors are the most economical and efficient means of providing 'on the spot' driving power for all agricultural and industrial purposes.

Reliable, flexible and smooth in operation, they effect savings that quickly pay for their installation.

Write for details on motors for single and 3-phase supplies.

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electric motors

TILLING-STEVENS LIMITED · MAIDSTONE ENGLAND

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Manufactured by MERSEY CABLE WORKS LIMITED, LINACRE LANE, BOOTLE, LIVERPOOL. BOOTLE 2777-8-9

A COMPANY

THEY DO IT *OUR* WAY USING **FRYOLUX** SOLDER PAINT

The elements of this immersion heater are tinned with Fryolux Solder Paint Grade "K". In this case the paint is applied by brush and heated by blowflame.

Fryolux can be used in many ways to simplify tinning and sweat soldering. Fry's Technical Department will gladly advise whether it can be applied to your problems, or if there are other Fry's Solders or Fluxes which would be of use to you.

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ELECTRICAL TIMES

Vol. 118 No. 3068 THURSDAY, 24 AUGUST, 1950

PUBLISHED EVERY THURSDAY

FIFTY-NINTH YEAR OF PUBLICATION

MAINTENANCE OF A.C. COMMUTATOR MOTORS *by A. C. Witts, B.Sc.(Eng.), A.M.I.E.E.* ... 291

OUR READERS' VIEWS... ... 298

LIGHTING FOR CONTROL ROOMS ... 299

NOTES ON WIRING *by Megohm* ... 300

PROBLEMS AND PRACTICE IN ENGINEERING... ... 301

DECORATIVE LIGHTING *by H. C. B. Woodcock* 303

PRESERVATION OF ART TREASURES ... 304

MEASURING DIELECTRIC LOSSES ... 305

OVERSEAS NEWS ... 306

PERSONALITIES IN THE INDUSTRY ... 308

POWER SUPPLY IN JULY ... 310

THE BUYER'S COLUMN ... 311

EXPORTS AND IMPORTS ... 313

SUPPLY STAFFS' SALARIES—THE NEW N.J.B. AGREEMENT 314

THE WEEK IN NEWS 315

Electric Supply News ... 319

Company Activities ... 320

COMMERCIAL INFORMATION ... 321

CLASSIFIED ADVERTISEMENTS ... *51*

INDEX TO ADVERTISERS ... *60*

SUBSCRIPTION RATES.—United Kingdom and Overseas £1 17s. 6d. per annum. Canada C$6.50, U.S.A. $5.50 per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies 6d. each.

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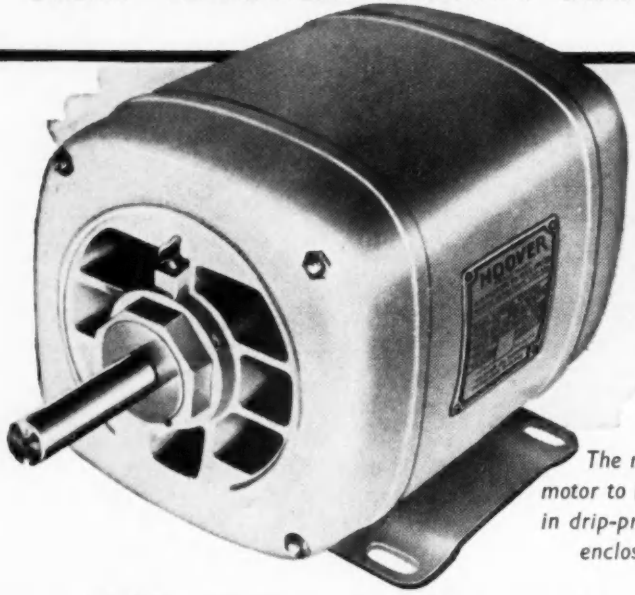
MANUFACTURERS WELCOME NEW HOOVER F.H.P. MOTOR



The new Hoover motor to B.S.S. 170/1939 in drip-proof and totally enclosed frames.

Practically constructed for ready use in a wide range of equipment

IN EVERY SECTION of industry, manufacturers are welcoming the new Hoover F.H.P. Electric Motor. Prices are extremely competitive, and the motors are highly efficient and absolutely dependable. This is not their only advantage. They are backed by the Hoover Five Point Service Plan, which provides full facilities for both service and advice for users throughout the whole country. Full information will be supplied on request to :—

HOOVER LIMITED

INDUSTRIAL PRODUCTS DEPARTMENT
CAMBUSLANG · LANARKSHIRE · SCOTLAND

Editorial

THE NEW AGREEMENT

THE negotiators of the new National Joint Board Agreement must be given more credit for the substance of the text than for the time schedule of its preparation. Applying from July 1, 1949, and signed in February last, details of the agreement have only now become available and it will doubtlessly be many months before the new conditions are fully implemented in all cases. Certainly the new schedule reflects more appropriately than the last, the status of engineers, particularly in the senior grades and certain outstanding questions have been settled, but was this delay really necessary? While it would be far from the truth to say that under nationalisation grading gives rise to few problems, the task of preparing a national schedule must have been infinitely simpler than would have been under the former conditions of individual undertakings. Perhaps also if the essential relationship of employee and busy executive had been kept in mind, some of the provisions might have been presented in less complex form, with some saving in time. Certainly the negotiators appear to have overlooked the maxim "he gives twice who gives quickly."

PACKAGED RADIO-ACTIVITY

TOO often the current developments in nuclear physics are considered in terms only of progress towards the atom bomb, or, more remotely, atomic power. In consequence, there is apt to be overlooked the vast strides that are being made in what might be termed packaged radio-activity. The facility of having a readily transportable radio-active source, of limited half-life and tailor-made to the job on hand, is leading to a rapid widening of this field of application. In medicine not only is it used for therapeutic purposes, but also for such diagnostic work as the location of cerebral tumours. As a tracer, radio-activity is seen at its best, for even in the most dilute concentrations it is readily detectable with Geiger tubes. There should be scope for the increasing adoption of such techniques within the electrical industry and in research establishments and radio-activity may also be found of particular value in electrostatics where it has already been applied to such tasks as neutralising static charges. The employment of radio-activity, however, not only requires care in its application, but precautions in its use. Fortunately, teams of specialist advisers are available in this field for assaying the use of this new tool for any particular task and directing its employment.

LEAVE THE SKIN

UNTIL the advent of the interpole, commutation was a major problem to every machine designer and operator, but with modern machines, sparkless running is usually a function of maintenance alone. There are many schools of thought on the details of commutator maintenance and most engineers have their own pet methods. Our own philosophy on commutators is simple—if they are running satisfactorily leave them alone; when trouble develops, act promptly. The I.E.E. discussion on commutator machines a couple of years ago left the impression that a.c. commutator motors were very much more temperamental than any d.c. machine and that special measures were necessary. Elsewhere, in this issue, however, we publish an article on commutator motor maintenance by an engineer who has had a very wide experience in this field, and it is interesting to note that our

view is endorsed. Blow out the machine, renew the brushes, brushgear, and take all other necessary steps. But the smooth brown skin that is the sign of a healthy commutator should be left alone as long as possible. When it develops roughness or grooving, then is the time for the stone, the grinder or the diamond tool.

STAND AND DELIVER!

IN spite of increasing price competition, there is evidence that deliveries of some manufacturers are little if any more competitive than they were in the worst days of the seller's market. What is even more annoying to a buyer, however, is that he is frequently unable to get a promise of delivery which is reasonably accurate. A case recently occurred in which a promise of less than two months, subsequently revised six or seven times, eventually stretched to nearly two years. This is, admittedly, an extreme case, but it is symptomatic of the conditions applying in certain lines, and seems to point to one of three things: too little attention to methodical progressing in the factory; the execution of orders out of rotation; or the promise of an impossible performance to secure an order. None of these will prove a lasting foundation for goodwill or profitable trading.

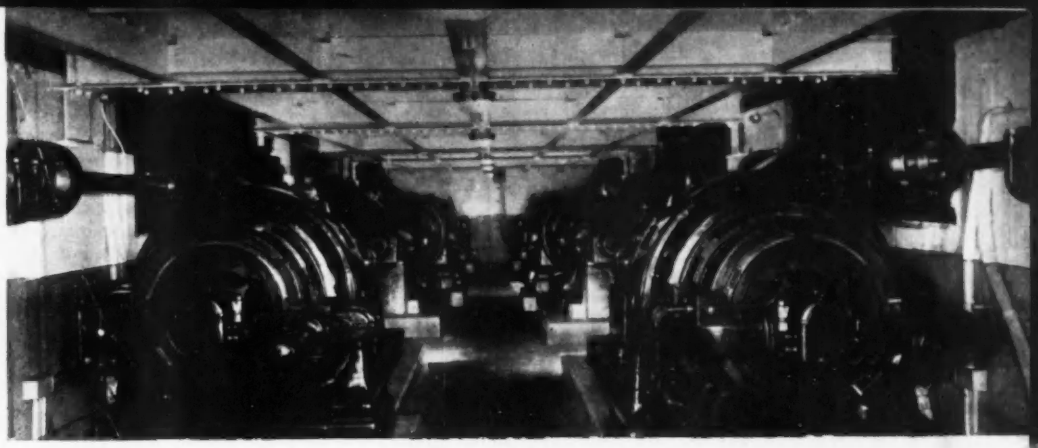
PRESERVING PAINTINGS

MANY years ago, if Meteor's memory serves him rightly, there was a debate at one of the larger University colleges in which the motion before the House was that: "Whereas the Scientist always knows something of the Arts, the Arts man knows nothing of the Sciences." Due to some enthusiastic support by the engineering and science faculties the motion was carried. At the same time a certain amount of criticism was heard from the defeated faction that the carrying of the motion was a put-up job. Nevertheless, there is more than a grain of truth in the conclusion, as is shown by the belated introduction, as an experiment, of air-conditioning and modern lighting in one of the rooms of the National Gallery. The effects of varying humidity on wood and canvas have been known to industry for many years, and air-conditioning has for long been accepted as an essential part of many manufacturing processes. Yet only recently has it been realised by the authorities that 75% of the deterioration of priceless paintings can be prevented by air-conditioning. And this was brought to their attention mainly by the necessity for air-conditioning when the pictures were stored in the Mendip caves during the war.

THE GRASS-DOZER

ELECTRIC lawn mowers seldom seem so infinitely desirable as they do when returning from one's holiday. The melancholy spectacle of a miniature jungle which, but two short weeks ago, was a well kept garden, must have hardened the resolution of many engineers to electrify their equipment without further delay. Desirable as the electric mower may be, however, existing forms fall short of what might be termed all-purpose requirements. Our specifications for an ideal mower would include several other features in addition to revolving blades. To begin with, it should have a scythe attachment on the lines of Boadicea's chariot for dealing with really long grass and weeds; and a built-in re-grinder for remedying blade damage caused by the stones and rubbish which are invariably found concealed therein (ferrous materials could be dealt with by a magnetic pick-up arrangement). Since a major portion of the labour in mowing is the emptying of the cut grass, it should either bundle this neatly after the manner of a combine harvester, or grind it up and exhaust it as a fine powder into the garden next door. It is a regrettable fact that electricity comes a poor second to the internal combustion engine for field work in large-scale rural operations, but the average suburban garden does not present any insuperable transmission problems, and if our grass-dozer could be marketed at about the price of a domestic vacuum cleaner, it should command a ready sale. Seed-harrowing, muck-spreading, and potato-digging attachments would, of course, be justifiable extras.

Meteor



MAINTENANCE of A.C. Commutator Motors

By A. C. WITTS, B.Sc. (Eng)., A.M.I.E.E.

FOR a long time the Schrage type commutator motor, as originally put on the market by the A.S.E.A. and the B.T.H. Co., has been a faithful servant of the a.c. engineer who requires smooth speed variation over a wide range, combined with shunt motor characteristics. In this country it has had extensive use in many industries, but particularly in paper-making and printing. In general arrangement and performance it has not altered a lot and is still being made in large numbers over a wide range of horse-powers, despite the competition of grid-controlled, arc rectifier fed d.c. motors. A recent article* dealt with the operating principles of these motors, with which engineers are generally familiar, and it will suffice to recount the main advantages:

1. Separate shunt characteristics for each brush position.

2. Constant torque over the speed range.

3. Infinitely variable speed range normally about 3:1 but may be much wider.

4. Power factor correction with increasing speed and load by slight modification to the brush rack rotation.

5. Direct on line starting with small overcurrent, if brushes are in the low speed position.

In the smaller size of these motors very few troubles are encountered, and the normal factory maintenance is sufficient, but in the larger sizes, where the design is closer, considerable care must be taken, particular in brush and commutator maintenance. This need is accentuated in industries such as paper-making, where commutator motors are required to run six days a week continuously on full load with only minor speed variations. Further, the capital cost of these machines is very high, rewinding costs are expensive, so that extra maintenance is always justified.

The writer would like to emphasise that troubles described in this article are particular ones, and that in general he has found the performance of a.c. commutators to be excellent, provided there is proper maintenance.

Most of the writer's troubles have been experienced on the commutator motor at full load, when the combined commutation and transformer voltages have caused severe arcing with quick wear of brushes and commutator. There are various patented methods of winding for reducing the sparking by lowering the commutation or reactance voltage and dealing with the transformer voltage. One of the earliest schemes was to make the regulating winding connections to the commutator of high resistance material, and to gain sufficient

Fig. 1 (above) shows eight 3-ph. commutator motors type KB each 140/48 h.p. 300/235 r.p.m. driving two rotary printing presses

*"A.C. Commutator Motors" by D. R. N. Seed—ELECTRICAL TIMES, July 20, 1950.

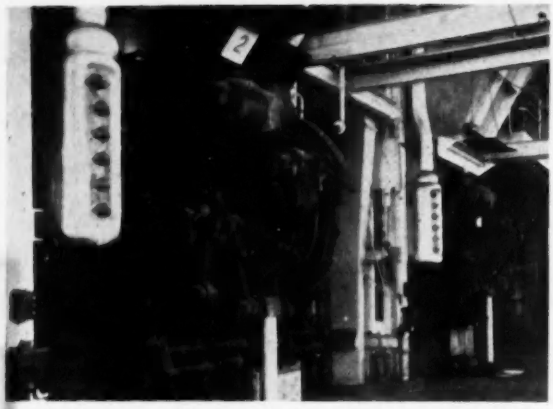


Fig. 2 shows variable-speed 3-ph. commutator motor KB17 3·2/0·6 h.p. 1450/360 r.p.m. driving Taylor multiple-retort gravity-underfeed stokers, capacity 40 tons per 24 hours

resistance the connections are sometimes made at the backside of the armature, brought to the front, being laid in the top of the main slots over the regulating winding. A more recent and successful method utilises a fourth high resistance winding connected across the commutator segments to act as a discharge winding, as shown in Figs. 8 and 9. By arranging the coils with different pitches, the commutated coil does not induce e.m.f.'s in the discharge winding coil, and by ensuring that the coil sides are displaced equal amounts on either side of the pole pitch axis the vector sun of the induced e.m.f.'s in main winding and discharge coils are zero. The discharge winding is, of course, of high resistance, and acts much as a field discharge resistance.*

*It is interesting to note, however, that one British manufacturer uses no such devices and this make of motor enjoys a high reputation for trouble-free performance.

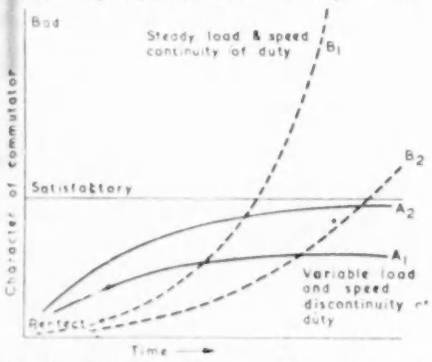


Fig. 3. Operation of commutator motors with various types of load

It is the general experience with the Schrage motor that its best operational performance is obtained when the motor is used frequently over a good proportion of its speed range, such as for lift and crane work. When the motor is used for normal constant speed with only small variations in continuous process work, it is found that commutator and brush wear can become very costly, and only constant attention will ensure 100% operation. In these circumstances, flats and burnt bars are produced for no apparent reason, and much of the experience related below has been gained under these more severe duty conditions.

Maintenance Details

The following notes are compiled from experience gained in dealing with some forty commutator motors totalling over 4,000 h.p., which run continuously 136 hours per week.

Windings

Little trouble should be experienced from the secondary winding on the stator, but the rotor with its two windings is a prime source of trouble. After some years of use these rotor primary and regulating windings become somewhat deteriorated, and it is inadvisable to interfere with them, as such action nearly always means a rewind in the end. Routine insulation varnish spraying is useful, and a lookout should be kept for loose slot wedges. In the writer's experience, fully loaded commutator motors do not last indefinitely without winding failure.

Commutator

Under good conditions with the machine, say, three-quarters loaded continuously, it should be possible to get up to 40,000 hours service from a commutator, without serious attention to it. It is true for a.c. commutator motors as for other machines, that once the commutator has acquired a good "skin" it should be left alone. Usually it will be noticed that the inner and outer brush tracks acquire different appearances, and that one appears to have a better skin, but under good conditions commutator wear does not differ a lot for the two tracks. The commutator and brushes create carbon dust, much of which is blown away by natural draught, but some will get into the spaces between the risers and pass to the

underside of the commutator, where some types of commutator machines have their equalising connections. Cases have been known where short circuits have developed behind the commutator due to carbon dust. Compressed air should always be used to clean this area thoroughly—ideally suction should be used to remove this dust, but in practice this is not too successful.

Fairly deep grooving of a commutator is quite usual providing there is no end float, but the time comes when servicing must be done. The a.c. commutator motor has very narrow bars, and very many of them, to keep the secondary current as low as possible, so bad grinding or turning can give a lot of extra work in undercutting. It is found that a specially

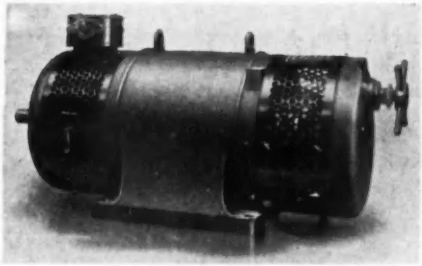


Fig. 4. Typical small commutator motor

shaped carbide tipped tool cuts very cleanly without burring and the commutator can be finished off by light grinding. Undercutting can be a tedious and costly job, but for the main work the writer uses a "Mighty Atom" right-angle drill adapted to take Martindale commutator saws (Fig. 12). This is so light and easy to handle that no guide is needed and large commutators are done in a fraction of the time for other methods.

When a duplex winding is used some condition has occasionally caused one-half of the winding to carry most of the current, with a very noticeable effect on the commutator, as illustrated in Fig. 13. Here every other bar shows signs of burring, the remainder being smooth with a good skin. Other p tterns have been noticed with other machines.

Brushgear

With a new motor there is little likelihood of trouble with the brush-shifting mechanism, and

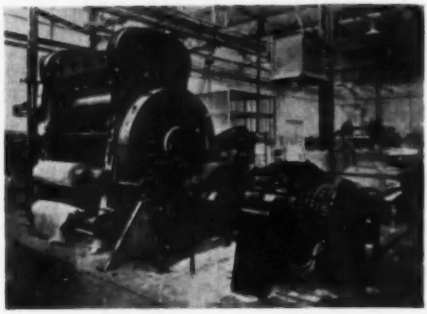


Fig. 5. Rubber callender driven by a commutator motor type KB rated 120/30 h.p. 730/190 r.p.m.

with motors which are regularly operated over a speed range any stiffness there soon becomes apparent. Certain drive applications using commutator motors, however, operate at a constant speed for hours and days at a time, the speed-varying property only being required to correct any small departure from a particular speed. In these cases the correction is applied to the brush mechanism by some speed-matching mechanism. The movable brush racks are mounted on trunnions, and under these conditions will often become stiff due to dirt and carbon dust accumulating. As a result, when the brush-moving mechanism has little power considerable speed deviation may occur before there is sufficient force to move the brushgear. Lubrication to trunnions is thus important.

When a commutator motor is dismantled for overhaul great care is necessary to replace the brushgear correctly. The maker provides marks on the two brush racks, and when the racks are turned these marks and two on the

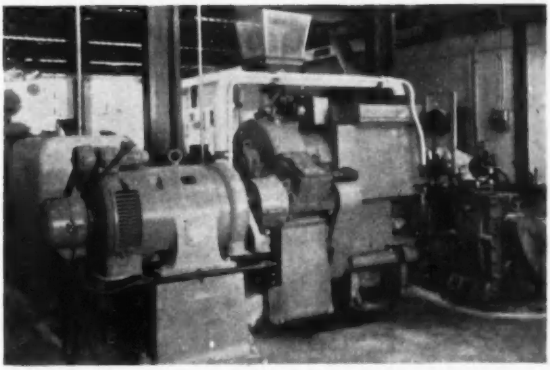


Fig. 6 shows continuous extension press used for covering small cables driven by a 40 h.p. 1460/460 r.p.m. commutator motor

fixed frame should all coincide at the same instant. This is arranged to take place at the point where the brush sets are opposite, and thus at which there is no injection voltage, the machine running as an induction motor. This setting is very critical, and the toothed rack is attached to the brush ring by screws in slotted holes to permit accurate setting.

Fixed Rotation

Motors designed for a fixed direction of rotation have their brushgear driving spindles fitted with pinions to move one brush ring at a

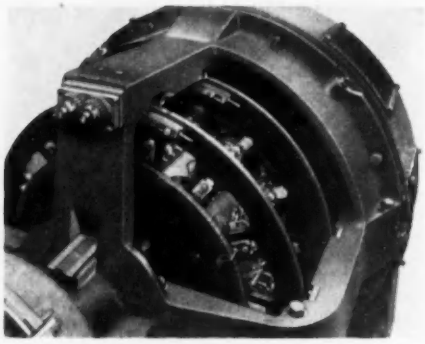
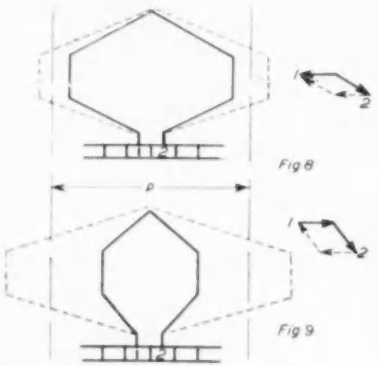


Fig. 7. Brush gear racking arrangements

greater speed than the other, so that the centre line of brush separation is given a lead in the direction of motor rotation. This in turn provides a phase advance and the voltage derived from the regulating winding is applied to the secondary with consequent power factor improvement. Should the motor be assembled with the pinion reversed, both the power factor and the motor load capacity are reduced. It is



Figs. 8 and 9. Discharge winding connections

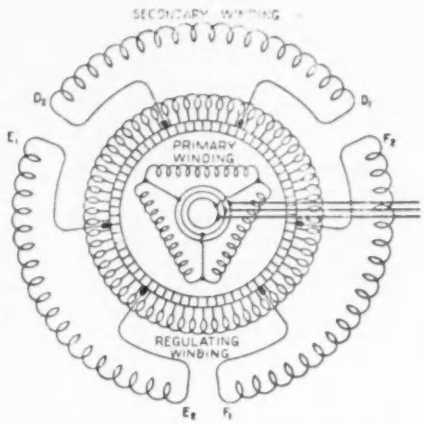


Fig. 10. Arrangement of windings of a Schrage motor

wise always to mark the motor direction on the frame.

That the correct setting for the brushes has been made may be checked by obtaining light run test figur esfrom the manufacturers, and checking that primary and secondary currents at top and bottom speeds are reasonably near those obtained at the works. It is sometimes

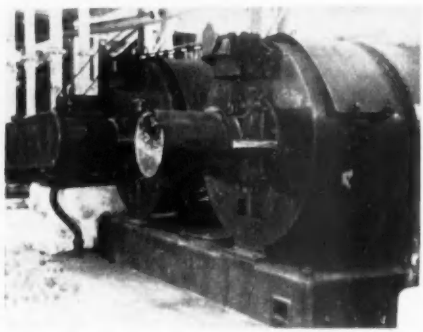


Fig. 11. Two 275 h.p. motors coupled together on one gearbox and brushgear coupled by shaft at top of figure

found difficult to get the setting correct, and if the machine is required to run continuously at some high or low speed it is important to check, preferably on load, that the secondary current is lower, and not higher, than the maker's figures.

Occasions have arisen when two commutator motors had to run mechanically coupled. This can easily be arranged provided the machines have similar characteristics or are

operating over a small speed range. It is the writer's experience that the charm of the motors of one leading British manufacturer is that they all have individualities, and that the most that can be hoped for is that they shall be nearly alike. The necessary parallel connection of the motors is carried out with the brush mechanisms connected together through a split shaft which is provided with a coupling that can be adjusted through small angles (Fig. 11). The two brushgears are locked together after adjusting the separate motor brushgear to give equal division of the current. Such ideal load-sharing will, however, most probably only be realised at one speed.

Brushes

Perhaps no part of a commutator machine requires more attention than the commutator brushes, particularly, of course, if continuous running is involved. Brush wear in a commutator motor is affected by the same factors as apply in the ordinary d.c. case, i.e. speed, brushgear spring tension, brush grade, state of the commutator and electrical loading, but in the case of the latter factor it is found that wear increases with astonishing rapidity as full loading or overloading is approached. This would appear to be due to the brushes having to deal with both reactance and transformer voltage.

Fig. 12. Mighty Atom right angle compressed air drill with commutator slotting saw

Thus, choice of a brush grade is an important matter, and the user must rely on the combined advice of the motor designer and the brush manufacturer. The writer recollects the installation of a group of 200 h.p. and 275 h.p. commutator motors some years ago with brushes supplied and recommended by the maker. It was soon found that brush and commutator wear were quite out of reason.

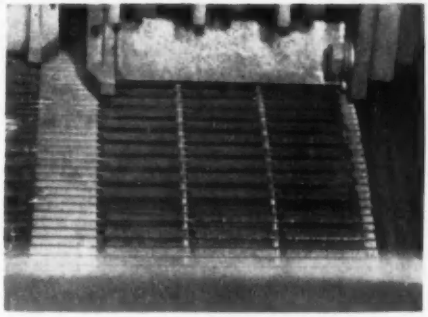


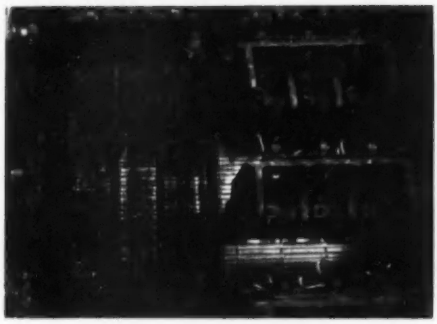
Fig. 13. Commutator marking on 200 h.p. motor with duplex winding

but the brush manufacturer was able to suggest a special grade which gave some years of excellent service. Recently, however, some of the machines concerned were modified and this involved reducing the length of the resistance leads between the commutator and the regulating winding. Immediately brush wear became so bad that 80 hours' continuous running used up the available brush length and production shut-downs were necessary to permit brush-renewal. Once again the brush manufacturers prescribed a solution, and the trouble was much reduced.

Brush Economy

The cost of brush maintenance is no small item in continuously running motors, which are only available for attention at the week-end. The electrician must each week decide if a brush will run another week, and naturally he doesn't take a risk. Any brush which is doubtful is removed, although only partly used. In this way, it is never possible to use much more than half a brush; it is a pity that no use can be

Fig. 14. Damaged commutator due to brush failure



made of the scrap so expensively purchased, and that brush boxes cannot be designed to make better use of the brushes. The user can, of course, help a small amount by making sure that brush boxes are followed up when commutators are ground, so that not more than $\frac{1}{8}$ inch projects below the boxes.

Many brushes have to be scrapped when quite new due to flexible fracture. This is always due to a commutator becoming uneven or flattened, the consequent high frequency vibration causes some strands in the pigtail to fracture, and this in turn increases the resistance at this point so that finally the flex almost burns through. Brush box arcing soon results, together with brush surface pitting, and serious trouble can rapidly build up (Figs. 14, 15 and 16 show damaged brushes, commutator and boxes after such a failure). There is only one cure; the commutator must be ground, stoned or turned.

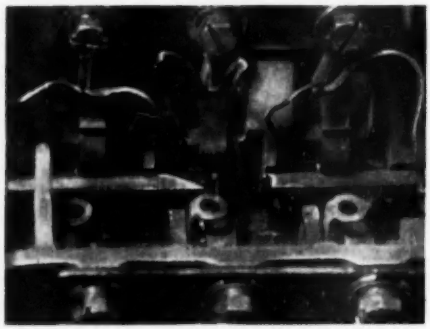


Fig. 15. Close-up of melted brush box

In one case bad trouble occurred in which the brush pigtails actually came out of the brush without any breaking or burning. These brushes, when tested in a vice with a spring balance pulling on the pigtail, gave pull-out forces similar to those of similar normal performance brushes. Naturally, the manufacturers claimed that the commutator needed attention, but as the matter put itself right without the commutator being touched, the query was pressed, and the supplier finally somewhat reluctantly admitted girl labour trouble with regard to the flexible fixing, and the fault was entirely confined to one batch of brushes.

It is of the greatest importance that similar grade brushes should be used throughout on each brush ring, but there are times when brushes may be out of stock and the maintenance electrician will be tempted to sub-

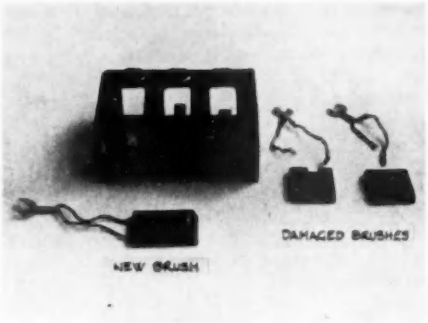


Fig. 16. New and damaged brushes with burnt-up brush box

stitute another grade brush of similar size. If necessity compels this to be done, it is important that all the brushes in a box (often with three brushes) should be changed, otherwise the different contact resistances may cause one or two of the brushes to take too large a share of the current with consequent heating and wear.

Bearings

Bearings present little trouble as a rule and usually need only the normal attention. In some of the large sizes sleeve bearings are fitted, and as with any other machine with a commutator end play should not become excessive, particularly when grooves have developed in the commutator. Some machines are subject to shaft currents, but this is usually known and the makers insulate the driving end bearing (Fig. 17). During maintenance overhaul mechanics should be warned of such machines, for the writer recollects a large machine having been taken down for commutator turning and after assembly it was put

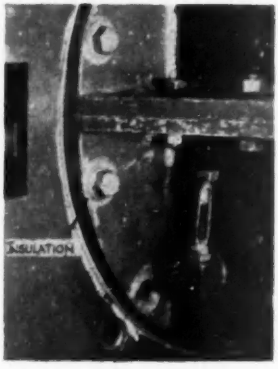


Fig. 17. Insulation arrangements for end shield

into spares stock and remained out of use for a long time. Occasion arose to install it, and after a a while there was a report that the shaft was rubbing the housing. Examination showed a beautiful "catherine wheel" effect which was obviously electrical and not by friction, a wire from shaft to frame through an ammeter showed current. As the machine had to run for several days a brush box and brush was fitted to shut the shaft current to frame. This current exceeded 20 A, but the diversion from the bearing enabled the motor to be kept running, the bearing oil being changed as it sludged up. When the machine was changed at the end of the week the journals were found to be badly etched and were only put right after extended lapping. The cause was not hard to find, the main insulation of the bearing was intact but a dowel's insulation sleeve had been damaged when put back, this insulation was modified to make damage less likely.

Similar trouble was experienced with a roller bearing which failed repeatedly with obvious marking of shaft currents and for this an

Fig. 18. Journal of 275 h.p. motor damaged by shaft currents

insulated housing was later provided by the makers. Such shaft currents from a commutator motor have been known to take their return path through other machinery driven by the motor. One case resulted in a serious tooth and journal wear in a large gearbox driven by a motor not suspected of this trouble. In the above cases of shaft current the cause was equipotential connections taken from the back side of the regulating winding to the commutator side, these connections being run through

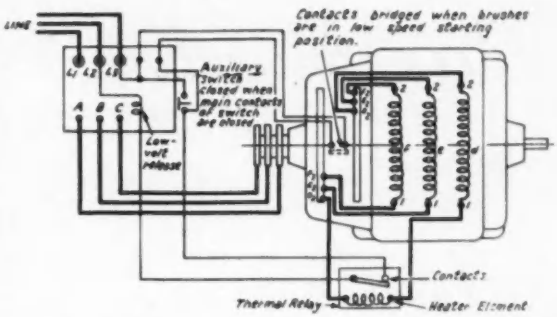


Fig. 19. Diagram of motor with thermal relay and brush position interlock for starter

the spider, the flux being sufficient to induce currents in the shaft, Fig. 18 shows a 275 h.p. motor shaft journal damaged in this way.

Protection

A commutator motor needs protection from ordinary excessive primary line current just as any other motor, and can be protected for this purpose by normal overload devices. In an ordinary motor running at constant speed, supply current bears a reasonable relationship to torque, and therefore load, but in the a.c. commutator motor this is not so, as for example with the motor running at, say, one-third speed and one and a half times full load torque, although full load current only is drawn from the line, the regulating and secondary windings are very heavily overloaded and will almost certainly burn out. From this it is apparent that the secondary current should be measured as well as the primary, but this is made difficult because the secondary current frequency varies from zero at synchronous speed to 25 c/s for top and bottom speeds in the case of a 3 : 1 speed range.

The only satisfactory protection is that provided by a thermal relay in the secondary lead, arranged either to give a warning or to trip the overload circuit breaker, Fig. 19. It is perhaps better to have two or three thermal relays in separate phases of the secondary circuit, arranged to give an alarm indication, for it is very easy for bad brushes to cause secondary unbalance which may cause a high current in one phase, but it may not warrant a shut down.

The writer is indebted to Messrs. B.T.H. Co., Ltd., for the use of Figures 3, 4, 7, 8, 9, 10 and 19 and to Messrs. Asea Electric, Ltd. for Figures 1, 2, 5, 6 and to Messrs. Bowater's Lloyd Pulp and Paper Mills, Ltd., for permission to publish the remaining photographs and the experience gained.

Our readers' views . . .

Promotional Tariffs

YOUR "Meteor's" note "Rural Costs" in your issue of August 10 mentions the low revenue obtained by the Eire Electricity Board's rural development; and, in pointing to the average price per unit sold, does it not put a finger on the reason for the disappointing expansion of use? For, while envisaging a bold constructional policy, the Board at the same time adopted a scale of tariffs which were far from being of a promotional nature.

An undertaking with a long history of successful rural development, the Hydro-Electric Power Commission of Ontario, stated in its 1941 report that the maximum economic limit for its first block of units for domestic use in the rural power districts was 6 cents per unit. The next block was then fixed at 2 cents.

In retailing electricity, excluding large power users, the "Hydro's" experience confirms the fact that tariffs control distributing costs *per unit* to an extent which normally outweighs any other factors such as changes in material and labour costs or in so called efficiency.

Explaining its deservedly famous ability to retail electricity successfully over its sparse rural areas, the "Hydro's" 1949 report states that:—

"Credit for the reduction in average *costs* belongs chiefly to the promotional form of modern rate schedules which are designed to give consumers the benefit of low overall costs of providing additional energy by means of existing distribution facilities.

"Under such promotional rate schedules, *providing the initial rates are not too high*, there is established a beneficial cycle of increased use leading to lower average cost which, if passed on to the consumers in the form of lower rates and prices, start a repetition of the cycle."

C. F. Matthews

NEWBURY SUB-AREA,
SOUTHERN ELECTRICITY BOARD.

• • •

Commutator Motors

REGARDING Mr. Baynes' criticisms of my article on commutator motors, I think he has read into it more than was intended.

As stated in the opening paragraphs, the intention was to provide information for those wishing to brush up their knowledge of the operation of commutator motors. Nowhere does it attempt to compare directly the respective merits of the two types. My personal opinion is that there is very little to choose between them for the general run of jobs—certain special applications favour the use of one type in particular. On balance, I prefer the stator-fed machine but this is purely a personal opinion and was not intended to be conveyed by the article. Makers of both types seem to do fairly well!

Regarding total enclosure, it is, of course, possible to enclose either type but the stator-fed is usually a more attractive proposition in this case, since the losses in the machine itself are smaller, owing to a portion being dissipated in the separate regulator.

I cannot agree that my article implies that the reliability of commutator motors is something which has only recently been achieved. There is no doubt that a properly applied and maintained machine does give entire satisfaction.

D. R. N. Seed

LONDON.

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Leakage Currents

I HAVE noted with particular interest the article on the checking of leakage currents which appeared in your issue dated August 17. The information given fully confirms the experience of my firm over many years and it was interesting to note that the records which were reproduced had been made on an "Inkwell" type H.S. graphic leakage recorder. This equipment has the special feature of self-protection in the event of heavy earth faults whilst still recording leakage current from less than one ampere upwards, no matter what the capacity of the power transformer may be. Thus, there is no necessity for a high speed relay for the protection of the meter as suggested by your contributor. The installation described in the article has a transformer where the neutral point is accessible. Similar leakage indicating and recording equipments are available using a special core balance transformer on systems where the neutral point is not accessible.

W. Bamford

EVERETT EDGCUMBE & Co. Ltd.

Lighting for Control Rooms

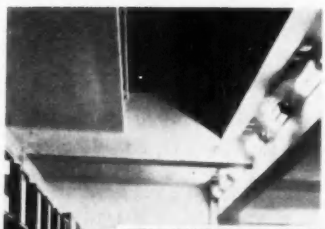
An Indirect Tungsten Installation at Walsall

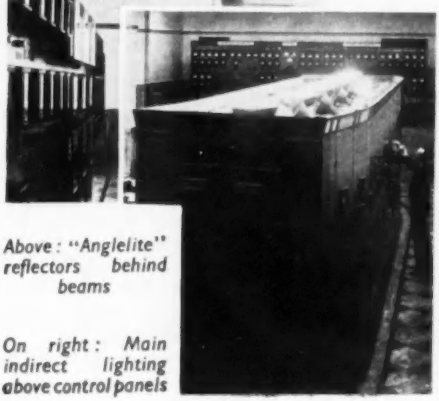
FEW will deny that control-room lighting presents a number of special problems, for which, up to now, no standardised solution has emerged. The necessity for avoiding reflections of the light sources in the glass fronts of the instruments, while preventing shadows being cast by the rims, presents no little difficulty, particularly when it is necessary, in addition, to provide good visibility from a number of different viewpoints and, at the same time, to avoid eyestrain and glare.

Tungsten lighting was chosen for control-room illumination at Walsall generating station, by the Chief Engineer (Construction), Midlands Division, B.E.A., since it was considered that its reliability under conditions of low voltage were greater than that of fluorescent lamps. At the same time it was laid down that no pendant lighting fittings were to be visible.

Ceneral view of control room. Lighting for the desk panels is from the apex of the roof lantern

Totally indirect lighting was utilised, as shown in the accompanying illustrations, a major part of the units being accommodated in the upper portion of the main control panel, the lighting design having been undertaken at a sufficiently early stage to enable the switchgear manufacturers to design their gear with a continuous recess for this purpose. The illumination so provided was graduated so that the brightness of the room at the end unoccupied by panels was reduced. Brightness of the ceiling immediately in front of the board was carried out by Benjamin "Projectolux" units.





Above: "Anglelite" reflectors behind beams

On right: Main indirect lighting above control panels

Additional Direct Lighting

For the illumination of the panels at each side, "Anglelite" corner troughs were concealed behind the main beam. The desk-type generator control panels under the roof lantern were illuminated by "Projectolux" units installed at the apex, thus avoiding any image of these units in the instruments on the main control panels.

The installation was planned by The Benjamin Electric, Ltd., in conjunction with the Chief Engineer (Construction), Midlands Division, and installed by France's Electric, Ltd.

Notes on Wiring
by **MEGOHM**

Tariffs and Wiring

All-in wiring is not always the cheapest

I HAD hoped that one of the early items on the B.E.A. programme would be the standardisation of tariffs, as these must of necessity influence to a great extent the methods adopted for large wiring installations. In the past one could readily obtain the terms available from the undertaker in any particular area, and it must be admitted that the choice in some instances was so wide as to be almost confusing. Today, although many of the old agreements are still running, once they have expired they cannot be renewed, and it would appear that, in future, our choice will thus be somewhat limited. For this reason it is necessary to allow for any eventuality.

During the last 20 years or so our standards have been increased far beyond those which formerly were deemed sufficient. With this I am in general agreement, though I seem to detect in certain quarters a tendency to over-elaboration with the amount of light provided for those parts of the accommodation where no actual work is being done.

Higher Loadings

In a large modern office building the installed lighting load may be perhaps 200 kW, to which must be added power for lifts, ventilation, boilerhouse plant, etc., which may amount to nearly as much again. If a canteen is included, which is the usual practice today, the total installed load is probably not much below say 500 to 600 kVA.

The first problem that arises is the fact that space for a transformer chamber will be demanded and it is becoming common practice to feed both in and out on the h.t. as well as on the l.t. side; the argument being that this method gives added security to the consumer in the event of breakdown. The former practice of erecting large substations on premises built for the purpose, either above or below ground level, seems to be out of favour with the powers that be, and in the result the consumer provides the accommodation for which he receives at most a purely nominal rental. I am not so sure that he is being treated quite fairly in this respect.

It is a clever man indeed who can forecast with any degree of accuracy, a year or two in advance, what the actual working conditions and consequently the consumption will eventually be, when the building is finally occupied. Unless one is prepared to enter into a long-term agreement, at the outset, the terms available may by then have changed, so for these two reasons alone I consider it essential that any installation of this nature should be wired on separate circuits for lighting, heating, power and cooking. By this means it is an easy matter to check the loading and consumption of the four categories, and select or change to the best tariff available.

Records and Charges

So far as my experience goes the tendency is towards three methods of charge, i.e. flat rates; a standing charge based on the installed lighting load, plus a low fixed unit charge; and a plain M.D. charge, with or without an additional fixed service charge, plus unit charge and coal clause.

Of these three tariffs I favour the second the least, for it will be seen that with the usual £9 per kW, £450 per quarter is payable in advance, and for this amount alone we could consume 21,600 units at a flat rate of 5d. per kW hour. In fact, for many modern types of office building, with the tendency to work shorter hours, I have found that the additional cost for separate risers has been recovered over and over again, as flat rates showed a distinct saving, and the additional cost was mostly in the extra switchgear and not to any great extent in the actual risers themselves.

Accurate record-keeping is also well worth while, and I recollect inspecting the figures of one large firm with some fifty premises in various parts of the country. From these one could see at a glance the average cost per unit to three decimal points and also the cost for each of the various departments. This meant the installation of a number of checkmeters and M.D. meters at suitable points in the wiring, which in the long run proved a very good investment.

Problems and Practice

IN ENGINEERING

Puzzling Symptoms

FAULTS which are, in themselves, very simple can often give rise to very peculiar symptoms. In such cases it is sometimes interesting to try and deduce the cause of the trouble merely from the statements made by the operator and before investigating the trouble at first hand.

One such case that had several of us "beaten" was that of a small s.c. induction motor, belt driving a small generator for test purposes. When switched on (direct-on) it gave forth a high pitched howl, the shaft began slowly to gather speed and, as it did, the *pitch* of the howl (i.e. the frequency of the note) began to decrease, until, when the machine was fully up to speed, the noise had disappeared. The machine then ran quite well on full load with normal slip, power factor, etc.

It was not until we had dismantled the machine that we solved the problem. In this type of machine the rotor pack was forced on to a splined shaft, there being no key or other means of drive between pack and shaft. In this case the splining of the shaft had only been half done and the rotor was not tightly held on the shaft.

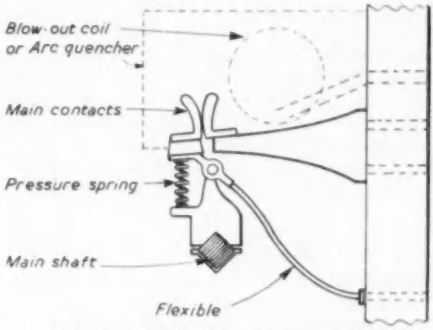
When the machine was switched on, the rotor pack immediately came up to speed but the shaft would be held by the load of the driving belt and the inertia of the driven machine. The high-pitched howl would be caused by the chattering of the splines on the inside of the rotor core. As the shaft gradually came up to speed, the relative motion between shaft and rotor would decrease, thus decreasing the frequency of chatter.

The friction between shaft and rotor pack was apparently sufficient to prevent slipping on normal load but not to withstand the sudden jolt of direct switching.—*Frank Cuttle.*

Contactor Maintenance

THE manufacturers of contactor gear recommend that main contacts should not be filed, but left to wear down to the best shape for good contact. Electricians on most plants spend a large proportion of their maintenance time filing contacts hoping to improve the contact area, but often resulting in a failure of the contactor during the working week.

A 150 ampere contactor controlling a high frequency induction furnace gave constant trouble, the main contacts and pressure springs getting very hot. The springs, when hot, collapsed and required changing weekly, and contacts monthly.



Contactor details for maintenance notes

A new set of main contacts (fixed and moving) were carefully fitted. They were set square on the faces and checked with a 0·0015 in. feeler. New springs were fitted and tension was checked with a spring balance to makers' instructions. The mechanical parts of the contactor were examined and shaft and bearings coated with flake graphite, which is cleaner than oil in dusty situations. The contactor was operated by hand to ensure it had a snappy action and was not sluggish. The main contacts, of a rolling butt type, were checked to see they rolled off the arcing tips when contactor was fully closed.

These contacts have now run 12 months on a 16-hour day without trouble or spares, and have not been filed after overload trips. They appear as good as new. The only attention they receive is a weekly wipe with a clean rag, though possibly in very dirty situations it might be necessary to use fine emery cloth. All other contactors and relays on the plant have been treated in the same way. The blow-out coils or arc quenchers checked for correct operation, contacts set square with correct tension, and relay cases made really dustproof. All this had the effect of making maintenance "hours into minutes" (as the advertisements say) leaving time for more important jobs.—*W.A.H.*

Railway Troubles

AN unusual failure occurred on a railway installation of a 20 h.p. capstan.

After installing the motor and connecting the pedal operated switch the capstan would revolve slowly and could be stopped by hand. As the job was new, and the fuses were in order, the pedal switch was examined but found to be making and breaking correctly.

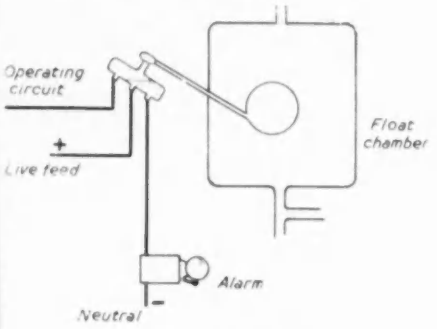
On further inspection at the fuseboard, fed from overhead wire, the trouble was located. A slap-happy jointer had connected one phase to the neutral bar and the other three wires to the fuses.

Another failure occurred on a 100 ft jib crane, on the same railway. Low voltage was suspected on this site, some distance from the substation. A test load of 6 tons was raised 10 feet but could not be lifted further. An examination of the control panel showed a badly burnt contactor which, on renewal, completely overcame the fault.—*Hugh Mitchell.*

Boiler Cut-outs

HAVING read the June issue of the ELECTRICAL TIMES I was particularly interested in W.H.R.'s "Boiler Cut-out Failure."

If a three-plate change-over type mercury

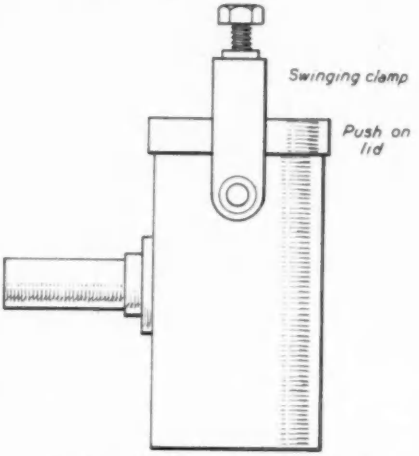


Circuit of water-level alarm

switch were used and wired, according to diagram above, the alarm would ring at low water as well as cutting out operating circuit. This would also be a safeguard against false reading of the boiler gauge glass.—*V. Wagstaff.*

Tumbling Box

IN the production of a prototype switch, or switchgear operating behind glass, the use of a small tumbling box will be found to be a quick method of obtaining a final finish on the various non-ferrous components. The tumbling box as sketched is intended to be operated by gripping in a lathe chuck. Heavy gauge brass tubing comprises the body of the box, and one end is blanked off by means of a suitable disc of brass brazed into position. A short length of $\frac{3}{4}$-in. steam piping, screwed at one end into a suitably shaped flange, which in turn is riveted or brazed to the centre of the body,



Tumbling box for component pol shing

forms the means of driving the box. A push-on brass lid, secured by a swinging strap and clamping bolt, completes the tumbling box. Do not fit a screw-on lid, as it locks solid when the polishing sand gets between the threads. Dimensions, of course, are dependent upon the size, and quantity, of work to be handled.

In use, a tumbling box must only be driven at a slow speed, as the components and polishing agent must roll, or tumble, from end to end as the box revolves. On the average lathe, back-gear should be engaged. A few experiments on scrap components using various polishing agents should be made. Polishing agents consist of coarse sand, fine sand, and for the final finish, small scraps of leather mixed with soap flakes. The box is filled to rather more than one-third capacity with components and polishing agent.—

F. R. Smedley.

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

Decorative Lighting

Complete Scheme or Patchwork?

by H. C. B. WOODCOCK*

IN recent years, the conception of light as a medium for creative design had made some progress, although not nearly enough. The lighting designer is now an established entity, one who does not require technical knowledge of illuminating engineering, but who does know something of the principles of good design.

The treatment for any space must first be considered in its entirety. Light must be treated as a basic material to be included in the complete scheme in the same way as the decorations, architectural features, furnishings, etc. Colour treatment, illusions of height and width, display focus are only a few of the contributions made by light. Good lighting schemes are inconspicuous by their presence and yet the number of shops, showrooms and public buildings where the lighting falls into this category, are extremely limited.

It is an undisputed fact that if a space or department be illuminated by a pleasant and attractive glow from an inconspicuous source, with emphasis lighting on points of interest, the feeling conveyed to the observer will be one of pleasant well-being in a bright and cheerful atmosphere. This is true of good lighting under any set of conditions. Light for lighting's sake should never be disassociated from the psychological aspect of the scheme. A comfortable 10 foot-candles will induce far more output from the worker than a meaningless 25; similarly the discerning customer will be more inclined to satisfy his material requirements if the general atmosphere is attractive rather than purely functional.

The Right Approach

In our complete schemes we should ask ourselves not what fixtures or fittings can we buy for so much money, but what we can do with light to make this or that place more liveable, what human wants can light fulfil to make this place more desirable. In America, mainly through lack of restrictions in the immediate post-war years, the field of intimate lighting has been more fully developed, and any concern of consequence carries its staff of lighting designers. Nevertheless, emphasis still is laid on the functional aspect of the scheme. For example, the Eggcrate ceiling is a great step forward, but even that ceases to serve any purpose once the observer is below it, the loss of efficiency caused by obscured glazing above the louvre is apparently considered to outweigh the advantages of a fully diffused light source.

It has been stated that one need not be a lighting engineer to design lighting schemes; this is now a proven fact, but once the scheme has been conceived, the engineer comes into his own. He will engineer and make practicable the designers' ideas, but . . . he should never allow the design to be swayed in favour of purely mechanical or electrical considerations of efficiency, or on account of consumption and installation difficulties, etc. Equipment must be adapted to serve new purposes, or manufactured to fulfil these requirements. Ingenuity and enterprise, hand in glove with the much-despised "man round the corner," will overcome all obstacles.

In stressing the proper consideration to be given to light as a basic requirement of any complete scheme, the contracts calling for a straightforward treatment must not be overlooked. Lighting fittings carefully chosen to blend into the scheme must undoubtedly take their proper place. They *must*, however, always bear a sense of relationship to the scheme as a whole and preserve that even balance without which all our efforts are futile.

We may see concerns offering standard lines which it is claimed can be fitted into any scheme. If our customers are so easily satisfied as to accept the commonplace without thought to the consequences, let us rather guide the enquiry into channels aimed at furthering the ideals of good lighting, rather than adopt as our motto, "From the Shelf to the Ceiling."

Lighting An Afterthought

Lighting has been, and in many instances still is, a question of what or whose fittings can be added after the proprietor or architect has decided how much money is left to serve this purpose. The advent of the lighting engineer, treating all his materials in their true perspec-

*Harris and Sheldon Limited.

tive, is doing much to overcome this unfortunate outlook. Much could be said of the efforts of some quite reputable concerns, to foist current production of quite unsuitable equipment on to a credulous public; of civic buildings now shuddering under the weight of industrial trough units, of stores in which fine merchandise is rivalled only by row upon row of bare fluorescent lamps, of churches equipped with so much daylight fluorescent as to resemble the inside of a public mortuary. Night has been converted into day, soft shadows have disappeared, and in exchange we are offered a meaningless blaze of cold comfort.

Real progress will only be made when the design office is divorced from the conveyor belt, and in the re-building of our cities, we can but strive to attain conditions in which all factors contributing to man's well-being are given their true and proper place.

PRESERVATION OF ART TREASURES

Air-Conditioning Installed at National Gallery

As part of a general scheme for modernising and improving the National Gallery, air-conditioning and artificial lighting has now been installed in Gallery XXIX, making it among the most advanced of its type in Europe. The reason for the adoption of air-conditioning is not, as would be expected, to improve the amenities as far as the public is concerned, although this, of course, follows automatically, but to ensure the preservation of the paintings. It was found that a great proportion of deterioration can be directly attributed to the changes in relative humidity, which cause canvases to sag or tighten and wood panels to warp and crack. Apart from these troubles, the sooty and dirty atmosphere of central London, combined with condensation, produces a semi-opaque film on the surface of the paint which is difficult to remove without destroying the paint itself.

The installation provides for a temperature of 65° F with air at 58% relative humidity throughout the year 24 hours per day. Extreme external winter and summer conditions catered for are 30° F at 78% relative humidity and 80° F with 58% relative humidity. The air circulation allows for 6 complete changes per hour, and in the interests of economy, recirculation of 90% can be introduced. The plant consists of filters, washers, heating and refrigeration and humidifying and drying equipment. Consideration was given in the preliminary investigation to the use of electro-static precipitation, but this was rejected as it was thought by the authorities that the small amounts of ozone and oxides of nitrogen generated by this process might, over a period of years, have a deleterious action on the pigments.

Lighting

Up to 20 years ago the National Gallery had been dependent on natural lighting, with the result that it had to shut at dusk. The introduction of tungsten lighting, however, enabled later closing to be achieved, and an illumination level of 3 to 4 ft-candles on the walls was thought to be extremely good. With the new fluorescent lighting installed, this has been raised to 15 to 20 ft-candles. An ingenious arrangement of louvres ensures that the fluorescent lighting does not interfere with daylight, and the effect is remarkably good.

It is proposed to deal with five other galleries in the same way if this experimental installation is successful. The existing air-conditioning plant is well able to cope with this load.

View of corner of gallery showing lighting louvres

Measuring Dielectric Losses

New 200 kV Schering Bridge

THE utilisation of high-voltage transmission over long distances makes it important to obtain accurate estimates of the losses to be encountered in insulators, etc. In order to aid this class of work, being carried out in the high-voltage laboratory of the G.E.C. at Witton, a new Schering Bridge, for use at power frequencies up to 200 kV, has been installed. The instrument was designed and made by Salford Electrical Instruments, Ltd., and utilises a standard gas-filled capacitor supplied by The Bushing Co., Ltd.

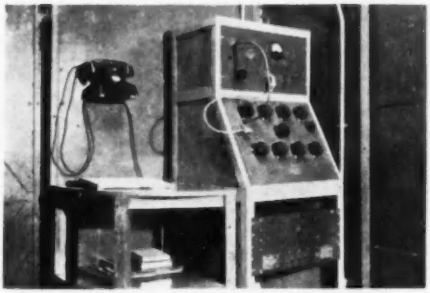


Fig. 1. Low voltage side of bridge showing rack mounting for amplifier and detector units

The low-voltage arms have been designed for rack mounting, as shown in Fig. 1, and consist of ratio arms, a detector unit and a small power unit for supplying the detector. In place of the usual tuned galvanometer, an electronic detector unit is used. This comprises a three-stage amplifier, thermionic rectifier and a milli-ammeter. The first stage of the amplifier has a feedback filter to attenuate harmonics, while a parallel "T" filter in the second and third stages provides a frequency selective feedback.

Stray Capacitances

Careful attention has been paid to the elimination of stray capacitances, cathode follower networks being employed between the bridge, test specimen and the standard capacitor, to counteract these sources of error.

Robust spark-gap protective devices are mounted on both standard capacitor and test object. These incorporate low-melting-point solder inserts which, in the event of a test object or the capacitor failing, provide a solid connection to earth. The high-speed protective gear associated with the power transformer then operates and clears the fault.

Capacitor Design

The standard capacitor has a value of 98·5 picafarads and can withstand 200 kV r.m.s. Its power factor is sensibly zero. It comprises two concentric polished brass cylinders mounted vertically and housed in a Texolex cylinder. The inner tube is the high-voltage electrode and is supported from the top casing. The outer tube is the low-voltage electrode and is connected to the centre pin of a socket mounted on the base of the capacitor. Dry nitrogen at a pressure of 200 lb/sq in. is used as the dielectric and the unit is mounted on insulated tripod legs and is self-supporting. Its overall height is 8 ft.

Measurement Range

The bridge permits capacitances of between 20 and 20,000 picafarads to be measured to an accuracy of ±1% or ±1 picafarad, whichever is the larger. This range is covered in five steps in a geometric progression by means of shunt selection. Power factors between 0·0001 and 0·5 can be determined with an accuracy of ±10% or ±0·00005, whichever is the larger.

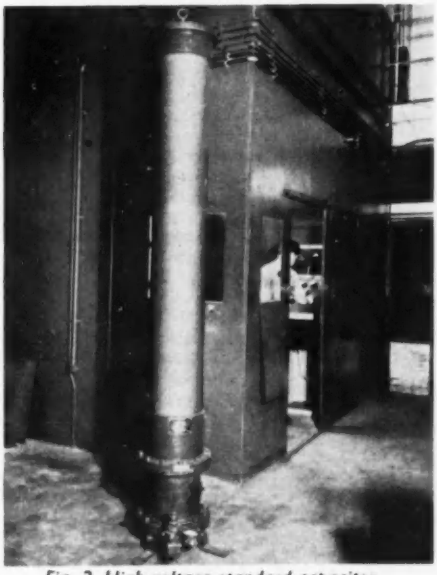


Fig. 2. High voltage standard capacitor

overseas news

New Station for Malta

Approximately half of the necessary $5 millions required for the construction of a new power station at Malta is to be provided from Marshall aid, it has been announced by the Economic Co-operation Administrative Mission to the U.K. We reported in our April 21, 1949, issue that plans were being prepared for the erection of a new station on the island, for the existing plant was becoming obsolete. The present plans envisage the construction of a station of 15,000 kW to 18,000 kW, made up by three turbo-generators. The associated boilers would be arranged for oil firing. It is anticipated that the load will rise to about 12,000 kW over the next four years, and the first stage of the plan will cover this, the third set being installed at a later date.

Progress at South Fremantle

Excellent progress had been made with the construction of the South Fremantle power station, Western Australia, in the past 12 months, particularly since April, the Minister for Electricity, Mr. Brand, stated recently. Although no date of opening has been fixed for the operation of the station, it should be ready next winter. During his tour of inspection, Mr. Brand noted that the building which will house the first section of the power station, of 50,000 kW capacity, consisting of two 25,000 kW turbo-alternators, had been completed. The No. 1 turbo-alternator was practically complete and the installation of the No. 2 machine was going ahead satisfactorily. The erection of four boilers was also proceeding. Construction has already begun of the second section of the station. Foundations are complete for carrying the plant, which will consist of a duplication of "A" section by an additional two 25,000 kW turbo-generators, complete with boilers. The station switch-house and control-room building is complete and the installation of switchgear is well advanced. In the control room all the panels are set up and the work of wiring is proceeding. To link the station with the East Perth station, 22 transmission towers have been erected. An oil-filled underground cable linking the overhead transmission line near Rivervale to the East Perth power station has been completed and tested over its 2½-mile length.

Adelaide Railway Electrification

A report on the proposed electrification of Adelaide's suburban railways is being prepared by the Public Works Committee for submission to the South Australia State Government. The cost to South Australia will be about £2 million. Announcing this, the chairman of the committee, Mr. Christian, said that the proposals before the committee covered the electrification of the Adelaide Hills line as far as Belair, the Brighton-Marino line, the main north line as far as Dry Creek, the Henley-Grange line, and the Port Adelaide line as far as Outer Harbour. The total cost of the proposed electrification was nearly £4 million, but under the Rail Standardisation Agreement Act, the Commonwealth Government would pay about 70% of the cost.

We reported on June 30, 1949, that following receipt of the first interim report of the Royal Commission on Transport, whose conclusions showed that it was desirable to substitute electric trains for the present Adelaide Metropolitan service, the project had been referred to the Public Works Committee for inquiry and report. Since that time, members of the committee have visited Melbourne, Sydney and other cities in the course of investigations.

Queensland Proposal

It is expected that the Queensland State Parliament, at its session which opens this month, will introduce a Bill to set up a hydro-electric authority to enable a start to be made on the proposed £8 million Tully Falls power scheme, according to reports.

Quebec Development

Since 1945, new hydro-electric developments involving the production of a million h.p. had been approved by the Quebec Government, Premier Duplessis stated a few days ago. Most recent enterprise to come before the Government was that of the Aluminium Company of Canada for development in stages of 400,000 h.p. on the Peribonka River in the Saguenay region. Premier Duplessis said N. Duboze, vice-president and general manager of the company, conferred with him recently, and plans and specifications of the Chute du Diable development were under study by the Quebec Department of Hydraulic Resources. Work on the project is due to start in the autumn. Apart from the Peribonka project, a 195,000 h.p. three-power development is under construction at Shawinigan Falls, and more than $30 million is being spent at La Trenche on the St. Maurice River for a 300,000 h.p. development. The Quebec Hydro-Electric Commission has worked on the 600,000 h.p. development at Beauharnois and is increasing production for Temiskaming and Abitibi districts by adding 30,000 h.p. to development based on Lac Dozois. Another north-western development costing $4 million has increased production by 20,000 h.p. in Abitibi. In addition, the Gatineau Power Co. has increased production from the Ottawa River by 25,000 h.p. since 1945.

Rural Restoration Work

A total of 180 miles of rural lines, damaged in last February's sleet storm in Western and West Central Ontario, is to be re-located and re-built by the Hydro-Electric Power Commission at a cost of $560,000, Mr. R. H. Saunders, the chairman, announced earlier this month. The mileage involved represents only the portions most urgently in need of reconstruction.

New Power Line

Canadian Utilities, Ltd., which supplies a wide area in Alberta and Saskatchewan, has just announced an addition to its construction programme of this year with the erection of a transmission line from Hanna to Castor, a distance of 44 miles. This project will cost about $140,000. The line will operate initially at 34,500 V, but later it will work at 60,000 V.

Indian Cable Factory

The Government of India proposes to place before Parliament during its next session a supplementary demand for a grant of Rs. 20 lakhs (£150,000) to commence work on its cable factory, it is understood. In collaboration with Standard Telephones and Cables Ltd., this factory is to manufacture dry-core paper-insulated telephone cables. It is to be sited at Asansol. When completed the factory will be capable of manufacturing cables worth 80 to 100 lakhs (£600,000 to £750,000) a year. It will go into production in about 18 months and will attain full production in three years. It will be recalled that the Indian Government announced last December that an agreement had been made with Standard Telephones and Cables Ltd. to establish the factory at an estimated cost of Rs. 1 crore (£750,000).

Increased Output

Electricity generated by public supply undertakings in the Indian Union during the month of May, 1950, amounted to 427 million kWh—22 million kWh more than in April, and an increase of 103% over the figure for May, 1939. The monthly report of the Central Electricity Commission, giving this information, based on returns from 503 undertakings, shows that power consumption absorbed 62% of electricity sold that month. Domestic consumption for the month increased 11·6% above the 1949 total.

Plant for India

An order for two Kaplan turbines, each of 35,000 h.p. for the Hirakud power station, India, has been placed with the German firm of I. M. Voith, Heidenheim.

Another Madras Project

A Rs 80-million hydro-electric scheme was sanctioned by the Madras State Cabinet recently. It is proposed to harness the waters of the Tungabadhra river at the dam under construction near Hospet. The construction will be spread over the next ten years. Power from this project will be supplied to the four neighbouring Ceded districts. It is estimated that 17,000 kW can be generated throughout the year by suitably regulating the discharge of water for eight months in the irrigation period and four months of the hot weather.

Battery Production

The new factory in Madras, for the manufacture of storage batteries, is expected to be in operation early next year. The Government of India has issued permits for the import of the necessary machinery and already part of the equipment is on its way. The factory will be situated at Saidapet, within Madras city. In the initial stages the output is expected to be about 50,000 car battery units annually. About 50 workers and a few British technicians will be employed. The British firm behind this development is Oldham and Son.

Hutt Valley Results

The report of the Hutt Electric Power Board for the year to March 31 last, just to hand, shows that a further 1,486 consumers were connected during the period, bringing the total to 24,842. Of the former number, 588 were in all-electric State houses. Revenue for the year amounted to £324,147, of which industrial consumers provided £103,235, domestic £122,321, while, in addition, domestic water heating was responsible for £44,125. There was a net surplus of £2,140. The average number of units sold per consumer increased slightly to 4,776. More than 50% of the consumers have electric cookers, and 55% have water heaters. On the generation side, the drop in the working cost p.u. sold to 0·565d was almost completely offset by the increase in capital charges p.u. sold.

Tangiers Supply

The old electricity company which has operated in Tangier for some years has now been purchased by the Administration. As one of the first steps in improving the supply, the possibility of changing the present system is being examined, but this would involve the erection of a new generating station or an arrangement for a bulk supply from the French zone. Although the French zone has power to spare, a further difficulty in this regard is the necessity to lay new power cables.

Colombia Development

A special mission appointed by the International Bank for Reconstruction and Development has outlined a broad programme of economic expansion for Colombia. One of the Mission's recommendations is that the Republic's electric power generating facilities should be increased by 85% by 1956, as an essential foundation and stimulus for development. It is estimated that the capital outlay for the whole programme would average about $500 million a year for the next five years.

PERSONALITIES

IN THE INDUSTRY

In succession to Dr. R. G. Jakeman, whose retirement we recently announced, **Mr. J. P. Huggard,** B.SC., A.M.I.E.E., has been appointed chief designer in the Engineering department of the General Electric Co. Ltd. Mr. Huggard studied electrical engineering at the Royal College of Science, Dublin University. After serving an apprenticeship with the (then) Lancashire Dynamo and Motor Co. Ltd. he joined the design staff of the G.E.C. in 1924, and nine years later was promoted to the position of senior electrical designer in charge of the section handling large a.c. and d.c. machines. He has for many years worked closely with Dr. Jakeman.

Mr. J. P. Huggard

At present shift charge engineer at the Upper Boat generating station, South Wales Division, B.E.A., **Mr. V. B. Pennell,** A.M.I.E.E., has been chosen for the position of power station superintendent at Douglas, Isle of Man, at a salary of £710 p.a., in succession to **Mr. B. H. J. Berryman,** A.M.I.E.E., A.M.I.Mech.E., M.Inst.F., who has been appointed deputy power station superintendent at Hartshead. Douglas Corporation has also appointed **Mr. C. E. King** as shift charge engineer. He is now boiler house shift engineer at Hackney generating station.

Mr. F. E. Scrivener, whose retirement is announced by E. K. Cole Ltd., was that company's first representative, joining the firm in 1927. Originally he covered the Southern Counties, but with the expansion of business his activities were lately mainly confined to Surrey, Sussex and Hampshire. He is succeeded in that territory by **Mr. J. W. Oldfield.**

Today, August 24, **Mr. G. S. Boyd,** A.M.I.E.Aust., retires from the position of general manager of the electricity undertaking of the Sydney County Council, Australia, after 46 years' service. Originally he was with the Sydney Municipal Council, but in 1936, ownership and control passed to the County Council. While serving as constructional engineer he was responsible for the erection of the Bunnerong power station. Mr. Boyd's successor as general manager is **Mr. C. J. Craggs,** A.M.I.E.Aust., who was formerly chief engineer, and the latter position is now taken over by **Mr. J. C. A. Fraser,** previously assistant chief engineer.

Held in excellent weather, the second annual golf competition at Stoneham in aid of the Institution of Electrical Engineers Benevolent Fund, organised by **Mr. W. P. Conly,** M.SC., M.I.E.E., local honorary treasurer, proved to be as successful as its predecessor. Members and their friends foregathered from the whole of the Southern Centre stretching from Weymouth to Brighton. The chairman of the Southern Centre, **Mr. R. H. Coates,** B.SC.(ENG.), M.I.E.E., presided over the meeting and was accompanied by Mrs. Coates, who presented the prizes. The winners were: 18-Hole Medal Competition, for handicap 15 or under—1st prize, **Mr. J. B. Bradford** (68 net) and 2nd prize, **Mr. R. L. Gamble** (73 net); Over 15 Handicap—1st prize, **Mr. W. G. Maddock** (75 net) and 2nd prize, **Mr. R. Coombes** (77 net). Winner of the P.G. Cup presented by Pirelli-General Cable Works Ltd. to the I.E.E. member with the best score was **Mr. W. G. Murdoch.** In the 18-Hole 4-Ball "Better Ball" Competition under handicap against bogey, 1st prize winners were **Mr. A. E. McCabe** and **Mr. W. G. Murdoch** (9 up); the 2nd prize winners being **Mr. A. J. Oliver** and **Mr. R. Morgan** (6 up). The Bogey Cup presented by the chairman, Mr. R. H. Coates, was won by **Mr. E. McCabe** and **Mr. W. G. Murdoch;** and in the 18-Hole Putting competition **Mr. D. S. Allom** and **Mr. G. Plant** tied with a score of 32.

Mrs. Coates presents the Bogey Cup to the winners, Mr. A. E. McCabe and Mr. W. G. Murdoch, in the I.E.E. Golf Competition

Mr. A. E. Dainty

Mr. F. S. Lill

Ecko-Ensign Electric Ltd. have appointed **Mr. F. S. Lill** as representative for Lincolnshire, being based in the company's Nottingham office at 57 Hounds Gate. The company has also appointed **Mr. A. E. Dainty** as representative for the North Western Sector of Birmingham. He will be based at the Birmingham office.

Another new appointment is announced by the General Electric Co. Ltd. It is that of **Mr. V. Easton,** A.M.I.E.E., as project development engineer at the Engineering Department of the Witton Works. Previously he was with C. A. Parsons and Co. Ltd. He gained early technical training at Faraday House where, in 1925, as the best student of the year, he was awarded the Gold Medal. A year later he obtained a degree in engineering from London University, subsequently joining the Heaton Works of C. A. Parsons and Co., where, initially, he was engaged in the test house and on plant erection on site. Later, he transferred to the Electrical Design Section, and in 1935 was promoted to the senior staff to supervise the design of both d.c. and a.c. machines, and to handle specialised technical problems such as the design of switchgear-testing alternators. He gave a paper on the latter subject before the I.E.E. in 1943.

Mr. V. Easton

His friends in the industry will be interested to hear that **Mr. T. G. Martin,** T.D., M.I.E.E., ASSOC.I.MECH.E., has decided to resign from the management of Gresham Transformers Ltd. to return to heavier engineering. He has accepted the appointment of assistant director of Public Works to the Government of Cyrenaica, and will be responsible for water and electricity supplies.

Sir John Kennedy, whose visit to Uganda was delayed through illness, leaves for Kampala on September 1, where he will be acting chairman of the Uganda Electricity Board until **Mr. C. R. Westlake's** return on October 19. Mr. Westlake sailed to America yesterday and returns to London on October 4.

OBITUARY

It is with deep regret that we record the death, on August 15, of **Mr. Francis Lydall,** B.A.(Cantab.), B.SC., M.I.E.E., M.INST.T., aged 77, who had devoted his whole life to the electrification of railways, on which work he built up a world-wide reputation. Before the 1914-18 war he was on the manufacturing side with Siemens Brothers and Siemens Brothers dynamo works. During that war he was attached to the Ministry of Munitions as principal assistant to Col. William McLellan, the first Director of Electric Power Supply. In 1917 he joined Merz and McLellan, the consulting engineers, of which he became a partner in 1927. He formally retired only 18 months ago, but as their consultant had continued to take an active part in the firm's work. While he was concerned with all the firm's traction work and took an interest in all its activities, he was particularly responsible for the two most extensive main line railway electrifications in the Commonwealth, that from Glencoe-Pietermaritzburg in Natal, and that from Bombay over the Western Ghats. India always greatly interested him. He knew the country and its people well and visited it eight times between 1917 and 1948, during which he made many reports for the Railway Board and advised several of the Provincial Governments on their post-war electrification plans. On his visit in 1940 he was also a member of the Roger Mission. He made several visits to South Africa and up to the time of his death was still a partner in Merz and McLellan (India) and in Merz and McLellan (South Africa). Latterly, and indeed within the last few weeks, he had been advising the Railway Executive on questions involving the future of railway electrification in Great Britain.

The death occurred on August 5 of **Mr. G. H. H. Lawrence,** aged 42, general sales manager of the Refrigeration Division of the Pressed Steel Co. Ltd. He joined that company as manager of the Manchester branch in 1942, later transferring to the head office at Cowley as service manager.

We regret to learn of the death on August 11 of **Mr. E. Powell,** aged 59, who actively directed the Tunbridge Wells business of electrical contractors of the same name. He was a prominent member of the E.C.A. Tunbridge Wells branch.

We note the recent death of **Mr. P. C. Thurston,** assistant district engineer, Slough, Southern Electricity Board.

We learn of the death, on August 19, of **Mr. E. S. Broadhead,** M.INST.C.E., chief designer for the J. L. Eve Construction Co., Ltd. He was responsible for many interesting designs including the Forth, Clyde, Cart and Tay River crossing towers for the C.E.B., and many radar towers.

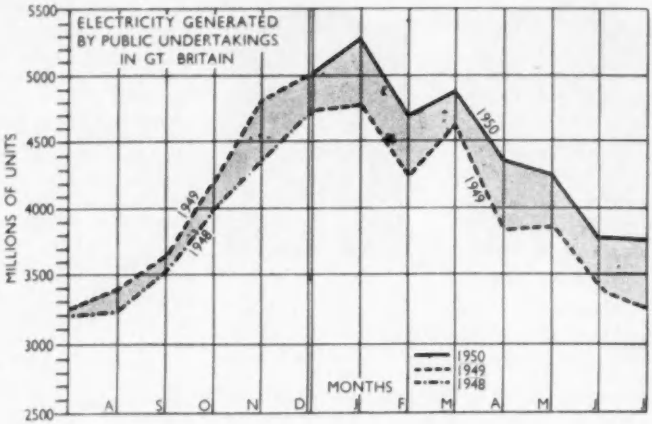
The death occurred on August 18, of **Mr. M. H. Galsworthy,** aged 78, senior director of the well-known lighting fitting firm of that name, of which he was a joint founder in 1896.

UNITS GENERATED

During the month of July, 1950, a total of 3,725 million units was generated in stations under the control of the B.E.A., the North of Scotland H.E. Board and the Lochaber Power Co. The corresponding figure last year was 3,262 million, so there has been an increase of 14·2%.

Of the total, 3,620 million units was generated in steam stations and 91 million in hydro-electric.

Energy sent out during the month was 3,505 million units, 94·2% of that generated. This gives the total for 1950 so far as 29,176 million units, an increase of 10·7% on the corresponding period in 1949.



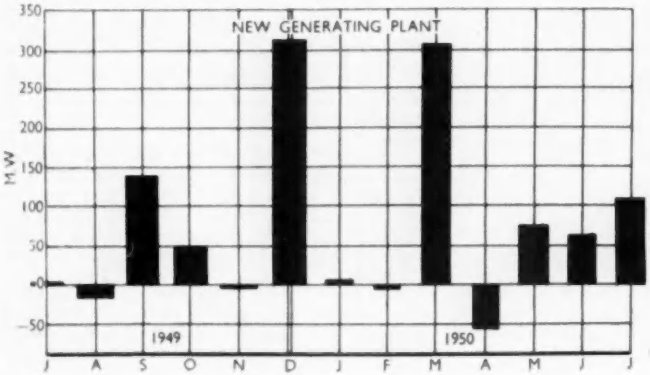
POWER SUPPLY IN JULY

TWO 60 MW turbo-alternators were commissioned on the B.E.A. system during July. The first of these is the English Electric 1,250 lb/sq in., 950° F set at Stourport B, in the Midlands Division, which was described in the ELECTRICAL TIMES on June 22, 1950. Staythorpe (East Midlands Division) is the site of the second machine, a B.T.H. machine working at 950 lb/sq in., 925° F, which brings the installed capacity up to 120 MW. The English Electric machine is hydrogen cooled, but conventional air cooling is used at Staythorpe (ELECTRICAL TIMES, May 18, 1950).

In addition to these sets, two boilers came into operation during the month, one at Cliff Quay (Eastern Division) and the other at Ferrybridge (Yorkshire Division). The first of these is a 365 k lb/hr B. and W. unit, while the second is of Mitchell manufacture, rated at 180 k lb/hr. This installation completes the extensions planned for this station up to the end o 1952.

Of the total of 3,725 million units generated, 3,640 million was the product of B.E.A. stations and 85 million of stations in the North of Scotland area. These figures are respectively 14·3% and 9% greater than a year ago, while the total energy generated for the first seven months of the year shows corresponding increases of 11% (B.E.A.) and 4% (N. of S.).

Steam stations have increased their output by 10·8% compared with last year, and hydro-electric stations by 4·4%. In fuel supplies, the weight of coal used is up by 8·4% and of oil by 35·7%, but it is important in this respect to note the relative amounts involved. 17,875,000 tons of coal have been used this year up to the end of July, but only 38,000 tons of oil fuel.



GENERATING PLANT

At the end of July, 1950, the installed generating capacity of the B.E.A. was 14,033 MW, 108 MW more than at the end of June. The North of Scotland total was 380 MW, showing an increase of 1 MW during July, and the figure for overall increase during the last twelve months becomes 972 MW, or 7·2%.

The installed capacity, used for the purpose of this graph, should be distinguished from the output capacity. The installed capacity is the total m.c.r. of all the generating sets which are connected on both steam and electric sides and are suitable for use.

The BUYER'S *Column*

The "E.T." Index

THE index to Vol. 117 of the ELECTRICAL TIMES (Jan-June 1950) is now available and a copy will be sent to anybody who requires it, on receipt of stamp.

Sockets for Prefabs

DIFFICULTY is sometimes encountered in obtaining replacements of 5 amp flush shuttered socket outlets, for prefabricated houses, as a number of manufacturers seem to have discontinued them. We understand that NETTLE ACCESSORIES LTD., of Harper Road, Wythenshawe, Manchester, are able to supply 5 amp 3-pin shuttered socket outlets of this type, in both switched and unswitched types, from stock. These are suitable for use with all standard boxes.

G.E.C. Lay On the Heat

THE season's programme of fires from the GENERAL ELECTRIC CO. LTD., of Magnet House, Kingsway, W.C.2, is described in an eight-page folder just issued, giving particulars and prices of portable and inset types, imitation coal and log fires, fan heaters, convectors, slot-meter types, and a useful list of spare elements and lamps. Illustrated is one of the portable models, the D2816, supplied in cream or green with chromium-plated tubular frame, which is priced at £5 2s. (plus £3 15s. purchase tax) without the louvre guard. This, supplied as an optional extra, is of anodised aluminium, and is priced at £1 plus 14s. 9d. p.t. The tax is, however, not payable when the guard is ordered separately.

The D2816 fire, with louvre guard

Electricity Turns the Page

FEW who have ever been hospitalised with injuries which include arms or hands will ever forget the miseries of being unable to read a book. The new "Kirdon" automatic page-turning machine will be a boon and a blessing to all avid readers who are unable to hold a book or turn the pages.

Manufactured by KIRDON ELECTRIC LTD., of 130 Vaughan Road, Harrow, Middlesex, the unit is fitted with an easily adjustable stand which can be positioned within ten degrees of the upright, and is rapidly adapted to any size of book. Page-turning is achieved by pressing a control switch adopted for operation by elbow or chin, the operating force being only one four-thousandth oz-in. Operated from a standard 200-250 V 50 c. supply and finished in cream enamel and chromium plate, the price is £12 12s. ex works.

The "Kirdon" page-turning machine

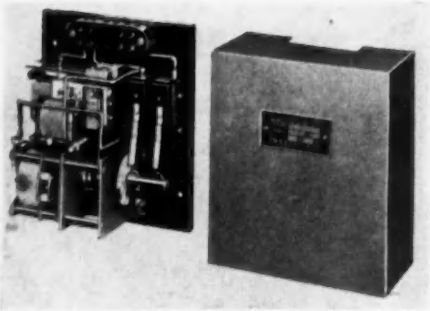
Warmth from the "Gulf"

PARTICULARS of the "Gulf" oil-filled radiator have been received from SLOAN ELECTRICAL CO. LTD., 41 Kingsway, W.C.2, who are the sole distributors for England and Wales. Controlled by remote thermostat, the "Gulf" radiator is intended for continuous or semi-continuous low-temperature heating, and is supplied in panel form in ½, 1 and 1½ kW loadings and in column form in 1 and 1½ kW loadings. Prices range from £7 17s. 4d. to £15 6s. 11d. exclusive of purchase tax.

Tailor-Made Transformers

AN interesting variation from normal mass-production technique is offered by JOHN DRUMMOND (ENGINEERS) LTD., of 23 Lochburn Road, Maryhill, Glasgow N.W., who specialise in transformers from 50 VA to 40 kVA, constructed to customers' individual requirements. Specialities include transformers for l.v. portable tools, and lighting and electronic transformers with multiple secondaries. Illustrated is a portable transformer for l.v. lighting, which has Reyrolle-type plugs and sockets for terminal arrangements and a neat carrying handle to facilitate transportation.

Drummond portable transformer for l.v. lighting or tools



The Londex type ROY timer

Synchronous Timers

PARTICULARS have been received from LONDEX LTD., Anerley Works, 207 Anerley Road, S.E.20, of their range of synchronous timers for process control of all types. Illustrated is the type ROY, designed for applications where the timed period is not often varied, but electrical starting and resetting are required for remote control purposes. Standard ranges vary from 60 sec full scale (in 5 sec divisions) to 24 hr (in 1 hr divisions). Control may be by main switch, by impulses from separate push-buttons or by a "start" button only, with automatic reset, and the contacts in arrangements are such that the circuit can be made (or broken) during the timed period or from the end of the timed period until resetting. Contacts are rated at 3 amp, 250 V, a.c. or 1 amp, d.c., and the consumption of the synchronous motor drive is 2 VA.

Other timers available include the type SRJ, a small adjustable unit and the type JPS, a dial-operated timer arranged for hand setting.

Dearer "Bills"

A COMMUNICATION received this week from BILL SWITCHGEAR LTD. of Aston Lane, Perry Barr, Birmingham 20, informs us that prices of "Bill" switch and fusegear will be advanced by 10% from September 1. This applies to their current publication 450 G.L.

TRADE PUBLICATIONS

WATER HEATERS. From Simplex Electric Co. Ltd., Broadwell, Oldbury, Birmingham, comes a copy of their latest publication, a throw-away leaflet covering the complete range of Creda water-heating appliances, including immersion heaters and circulators, pressure and non-pressure type storage heaters, and washboilers.

NAMEPLATES. Folders from Millett, Levens (Engravers) Ltd., of 47 Whadcoat Street, Finsbury Park, N.4, give some indication of the wide range of nameplates in which they specialise, including cast and embossed plates, printed ivorine and plastics, and chemical engraving, as well as actual engraving, dies, moulds and stamps. Millett and Levens claims to have supplied one or more of their products and services to every industry in the U.K., and are prepared to submit designs without obligation.

PNEUMATIC CONVEYORS. A recent issue of the *B.V.C. News Service*, issued by the British Vacuum Cleaner and Engineering Co. Ltd., of Goblin Works, Leatherhead, Surrey, gives an example of industrial cleaners being used as pneumatic conveyors, handling coloured cement, which takes cement from the mixing floor and delivers it to a 1 cwt weighing and bagging machine.

MAGNETIC CLUTCHES. "Burnand Phoenix" magnetic clutches are described in a leaflet received from W. E. Burnand & Son, of Shoreham Street, Sheffield 1. Several types are illustrated, including pulley and coupling clutches, releases, reversing clutches, and brakes either applied or released by electro-magnetic means.

INSTRUMENTS. From the Electrical Instrument Co. (Hillington), Ltd., comes a 24 pp. catalogue describing their range of measuring instruments from 2½ in. and 3½ in. moving coil ammeters and voltmeters, to 8 in. switchboard pattern instruments. Portable and laboratory instruments, universal test sets and pyrometers, are also listed.

HEATING APPLIANCES. A 24 page folder from Electroway Heaters Ltd., Loughborough, Leicestershire, covers their range of panel and portable radiant fires, screen type portables, convectors, boiling rings and tubular heaters.

RECTIFIERS. Rectifiers for d.c. supply to electrochemical processes are described in detail in publication No. R226, released by Hackbridge and Hewittic Electric Co. Ltd., of Hersham, Walton-on-Thames.

LOUD-SPEAKERS. The A.D.C. loud-speaker is the subject of a brochure issued by Audio-Acoustic Diffusers, Ltd., of Brook House, Park Lane, W.1, which gives a very interesting factual account of the design problems of loud-speakers and the methods by which their A.D.C. speaker overcomes many of them, including resonant frequency troubles. Full technical details and characteristics are given.

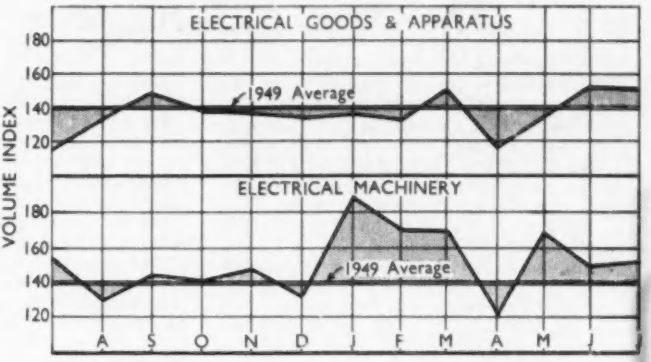
VACUUM EQUIPMENT. A "Digest" of high vacuum equipment has been issued by W. Edwards and Co. (London), Ltd., of Worsley Bridge Road, London, S.E.26, which covers a large part of the standard range of vacuum equipment manufactured for laboratory and industrial use. Equipment listed includes rotary and diffusion pumps, rough vacuum and combined units, water jet pumps, vacuum gauges of many types, and special plant, including cathodic sputtering coating plants, freeze drying and vacuum sublimation equipment, diffraction cameras and vacuum accessories.

EXPORTS AND IMPORTS

EXPORT VOLUME INDEX

Trade returns for July show that £7,265,401 was the value of electrical goods and apparatus exported during the month, while for electrical machinery the corresponding figure was £3,614,085. Adjusted for price charges since 1947, these values are equivalent to 150% and 154% respectively of the average export rates achieved during that year.

Export targets are no longer issued by the Board of Trade, and so comparison is made with the average rate of exports during 1949.



ALTHOUGH exports in general were down last month, due to the incidence of holidays, the output of the electrical industry for that period was only £29,447 below the total for June—a very creditable performance. In the main, the fluctuations of the various items was small, the only major variation being for wireless apparatus, which jumped £561,854 in value on the figure for June. In the total of £258,036 for electric cooking and heating appliances exported during July, electric irons alone accounted for £47,103, compared with £51,102, in June. Surprisingly, perhaps, the exports of electric motors dropped last month, too. Of the total of such goods, those up to ½ h.p. amounted to £86,657, from ½ h.p. to 1 h.p. £29,998, and from 1 h.p. to 250 h.p., £367,741. Exports of all electrical goods to Australia last month amounted to £1,320,088, to South Africa £1,041,887, to India £693,752, to New Zealand £327,716, and to Canada £255,864.

Description	Exports Value Month of July			Imports Value Month of July		
	1948	1949	1950	1948	1949	1950
	£	£	£	£	£	£
Telegraph and Telephone Wires and Cables—						
Submarine	2,311	40,394	425,475			
Other	728,857	621,386	658,316	17,181	4,763	6,206
Rubber Insulated	610,498	281,689	332,415			
Insulated, other than Rubber	900,026	814,578	618,705			
Wireless Apparatus, including Valves	987,104	861,642	1,487,546	58,679	64,829	187,820
Telephone and Telegraph Apparatus	1,129,188	1,080,841	1,489,415	11,835	7,250	13,472
Electric Lighting Appliances, Accessories, Fittings and Parts—						
Bulbs and Discharge Lamps	177,804	110,178	135,892	4,629	12,614	23,739
Other Descriptions	527,969	357,607	312,524	5,001	4,902	31,146
Batteries (primary)	41,766	83,668	192,495	—	—	—
Accumulators, Portable	225,551	216,268	233,251	—	—	—
,, Stationary	62,095	28,059	18,630	—	—	—
,, Parts and Accessories	54,078	62,441	75,616	—	—	—
Electrical Cooking and Heating Appliances	385,979	226,401	258,036	—	—	—
Ammeters, Voltmeters, etc., and Parts	103,953	61,947	106,000			
House Service Meters	195,983	117,594	76,302	21,186	23,889	30,978
All Other Instruments	85,076	59,293	122,740			
Electro-Medical Apparatus	22,703	22,520	44,275	—	—	—
X-Ray Apparatus, etc.	59,388	33,198	71,446	34,240	34,384	29,519
Insulating Materials	145,708	114,965	161,110	—	—	—
All Other Articles	398,100	332,971	445,212	79,268	51,198	73,818
Total of Group	6,704,139	5,527,640	7,265,401	232,019	203,799	396,708
Electrical Machinery:—						
Generators (not exceeding 200 kW)	272,618	682,346	595,239			
,, (exceeding 200 kW)	156,494	429,748	313,720	19,593	19,011	28,987
Parts	143,631	83,614	308,350			
Motors	791,123	749,584	636,533	17,892	14,071	18,336
Convertors, Transformers, Rectifiers, Motor Control Gear, Switchgear, other machinery	1,321,384	1,519,781	1,760,243	10,874	10,470	14,876
Fans, Electrically and Power Driven	106,329	104,986	92,247	—	—	—
Vacuum Cleaners or Electrically Operated Appliances	192,245	187,501	337,288	4,735	4,988	9,171
Total Appliances and Machinery	9,687,963	9,185,200	11,309,021	285,113	252,339	468,078

SUPPLY STAFFS' SALARIES—

The New N.J.B. Agreement

FULL particulars are now released of the new N.J.B. agreement covering salaries and conditions of employment of technical staff in the electricity supply industry. We recorded some time ago that the National Joint Board for the Electricity Supply Industry, after much discussion, had agreed on a basis for the revised schedule of salaries and gradings. Indeed, the new agreement is operative from July 1, 1949.

The old N.J.B. schedule, it will be remembered, covered 14 classifications and 19 grades, set out according to plant capacity or maximum demand. In the new schedule "A" there are 13 classifications and 22 grades applicable to power station, sub-area and district staffs, arranged according to plant capacity or units sold. In addition, schedule "C" relates to headquarters, division and area staffs, each with further grades.

Classification

The determination of classification for power station staff is much the same as before, but in the case of district and sub-area staff it is based on the units sold per annum, except that where large consumers are supplied only 30% of such units are counted. A small table is given to classify the large consumer.

Of the power station staff, the superintendent is placed in Grade 1, his deputy in Grade 3, followed by boiler-house superintendent, turbine-house superintendent and some maintenance engineers (electrical) in Grade 6, and shift charge engineers in Grade 7. On the sub-area side, deputy sub-area engineers, and certain district engineers are classed in Grade 3, but where the latter are in the double headed district category, and are responsible for the preparation of schemes and estimates over and above extensions for existing l.v. networks, they are placed in Grade 2. Likewise a district commercial engineer may be in Grade 3 or 4 in the double-headed district, and 4 or 5 in the single-headed type, according to whether he deals with schemes and estimates in connection with supplies to factories. Gradings drop to 7 for certain first assistant district commercial engineers.

Salaries

It will be evident from the foregoing that the document is of considerable length, and at the present stage, we are unable to deal with it in great detail, but to indicate its scope we give some examples of the salaries.

Thus, in Schedule "A", Class "A", covering power stations from 1,000 kW to 4,000 kW m.c.r. capacity, and sub-areas and districts selling up to 8 million units p.a., the salaries range from £702/£762 for Grade 1 (superintendent) to £375/£397 for Grade 10 (station shift control engineer, or third assistant sub-area engineer).

Under Class "E", for stations of between 25,000 kW and 50,000 kW, or sub-areas and districts selling from 50 million to 102 million units p.a., the Grade 1 salary is £935/£977 p.a., Grade 2 is £856/£896, Grade 3 is £775/£809, Grade 4 is £722/752, dropping to Grade 14 at £375/£387 p.a. Higher up the scale, under Class "G", for 100-150 MW stations or sub-areas and districts selling between 202 and 302 million units, Grade 1 is £1,069 rising to £1,119. In the highest listed class, for stations of between 600 MW and 1,000 MW, or sub-areas selling from 1,522 to 2,540 million units, the figure for Grade 1 is £1,575/£1,627.

In Schedule "C", for headquarters staff, the minimum salary in Grade 1 is £869, extending to £1,219/£1,235 p.a. where the capacity is over 6,000 MW or more than 15,240 million units are sold. Corresponding figures for Grade 6 (the lowest in the Group) are £375 and £574/£586.

Again, for division and area staff, the minimum for Grade 1 is £884, extending to £1,152/£1,175 for the highest output or sales, while corresponding figures for Grade 9, the lowest, are the same as for Grade 6 of headquarters staff.

Adjustments

To all the rates there is an addition of 5% (with a minimum of £25 and a maximum of £50), for employees in the London area. But there is no longer a cost-of-living adjustment. There are also other arrangements for modification of remuneration in certain circumstances, e.g. in the case of hydro-electric stations, where employees are given two grades less than in steam stations.

If, in consequence of more plant being brought into, or existing plant being put out of use, the classification of a station, headquarters, or division is varied, the revised classification shall be effective from the first day of the month following the change. But in regard to district, sub-area or areas, the revision is to operate from the beginning of the Board's next financial year.

The new agreement also covers such items as allowances in cases of illness, and holidays, in which the employees have obviously gained important concessions. In regard to sick pay, a table sets out the period allowed at full and half salary according to the length of continuous service, and now, employees under 21 years of age at April 1, who have been in continuous service for more than 12 months, are entitled to two weeks holiday, plus a day for each year of service after the first year, up to a maximum of three weeks.

Similarly placed employees over 21 years of age, getting from £500 to £749 p.a., get three weeks and three days holiday, plus a day for each year of service after the first year, to a maximum of four weeks. Employees getting over £749 p.a. automatically have four weeks holiday.

THE WEEK

INDUSTRY *in news* COMMERCE

Reyrolle's Open Days

SOME weeks ago invitations were issued to employees of Messrs. A. Reyrolle and Co. Ltd. to bring parties of relatives or friends to visit one or both of the Hebburn and New Town Works, on Thursday, Friday and Saturday of last week. Some four thousand visitors, in consequence, had an opportunity of seeing the works and the switchgear made there. Great interest was shown in a high voltage flashover on a 132-kV bushing at power frequency, and in the short-circuit testing station and its equipment.

Touring Reyrolle's Works

Centenary of the Submarine Cable

ONE hundred years ago on August 28, 1850, the laying of the first submarine cable across the Straits of Dover by the brothers J. W. and Jacob Brett, marked the birth of international telecommunications. To celebrate this centenary, and to demonstrate the remarkable facilities for world-wide communication which are now available via the network of submarine cables, a special exhibition is to be held at the Science Museum. This exhibition will be formally opened by the Post Master General on August 28.

Organisations taking part in the exhibition, which has been sponsored by the Science Museum, include the G.P.O., Cable and Wireless Ltd., Western Union Telegraph Co. Ltd., Telegraph Construction and Maintenance Co. Ltd., Siemens Bros. Ltd. and the Institution of Electrical Engineers.

The general theme of the exhibition is the development of land telegraphy from 1837 onwards. The laying of the first primitive submarine cable in 1850 and the subsequent early Atlantic cables will be illustrated by appropriate exhibits, and the development of submarine cables throughout the century shown. Modern practice and future trends will be specially illustrated together with exhibits of equipment and methods employed in cable manufacture and repair. Working exhibits will be prominently featured and, during certain times, it will be possible to witness the transmission of messages to overseas destinations and receive a reply within a few minutes.

A handbook entitled "100 Years of Submarine Cables" has been prepared by G. R. M. Garratt, M.A., M.I.E.E., of the Science Museum and will be on sale, price 2s. 6d.

The exhibition will be open to the public, free, on August 29 and will remain open until Saturday, October 28. The opening hours are from 10 a.m. to 6 p.m. weekdays, and from 2.30 p.m. to 6 p.m. Sundays.

An Unattended Studio

THE B.B.C. Engineering Division has installed an unattended set of studio equipment in the Guildhall, Southampton, to deal with topical interviews with celebrities disembarking from transatlantic liners. It is hoped that the studio, opened by the Mayor of Southampton recently, will avoid the necessity of sending an engineer and duplicate set of outside broadcasting equipment from Bristol.

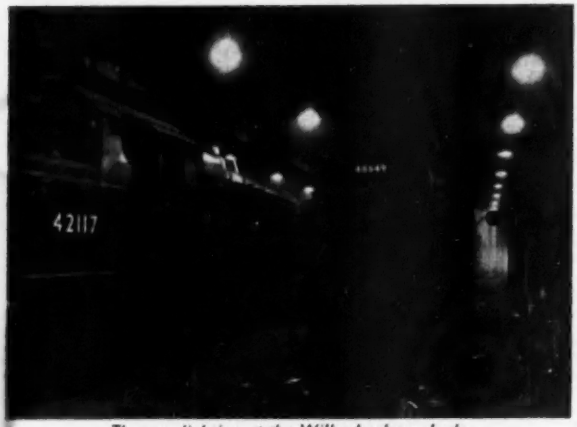
The equipment is installed so that programmes can be sent via G.P.O. lines to Bristol without anyone being present other than the celebrity and interviewer. When switched on, the microphone output with the necessary amplification and electrical corrections, will appear at Bristol and be switched into the broadcast chain. Unauthorised use is impossible, the output cannot be transmitted without action in the receiving control room.

The First Half-Century

The greater part of the past week I spent in Paris attending the joint meeting of the British and American electrical engineers and trying to see something of the exhibition. Of the large machinery the Willans-Siemens set is one of the finest exhibits in the section, though a vertical engine of the Allis type coupled to a Thomson-Houston dynamo, both built by French engineers, runs it close. At the Parsons stall there was a turbine running on light load, and the almost complete absence of vibration was ingeniously shown by three pennies balanced edgewise on the turbine. There I received a ticket to view the *Turbinia*, then lying in the Seine opposite the exhibit of sea and land armament.—*From our issue of August* 23, 1900.

Locomotive Depot Lighting

EFFECTIVELY lighting locomotive sheds presents many difficulties, as overhead fittings are subjected to onerous conditions of corrosion and moisture due to steam and smoke from the locomotives. A new general lighting scheme



The new lighting at the Willesden Loco sheds

installed in the running shed at Willesden Motive Power Depot, London Midland Region, is therefore of interest. The fittings, numbering 125, were designed as the result of collaboration between the Civil Engineer's Department, L.M.R., and the General Electric Co., Ltd. They are suspended at a height of 15 ft in rows between the shed roads, with a 15-ft spacing between fittings and between rows. Fittings in adjacent rows are staggered so as to give even illumination over the whole area. Two switches, controlling alternate lamps are provided for each row of fittings so that either half or full lighting may be used as required.

The type of fitting used has a die-cast aluminium body pyluminised and painted with two coats of enamel. A top coat of bitumastic paint is also applied in accordance with L.M.R. practice. The interior of the fitting is stove-enamelled white and the lamp itself protected from the outside atmosphere by a clear glass visor cemented to a hinged ring secured to the body in the closed position by wing screws. An oil-resistant gasket gives complete sealing for the 150 or 200-W tungsten filament lamp.

The lighting of the shed with the new fittings is adequate for normal inspection and maintenance, but supplementary local lighting from fluorescent lamps mounted on trollies designed for easy mobility between the roads may be used to facilitate maintenance of small parts.

Mystery of the "9.23"

MANY people have noticed that in illustrated brochures, photographs and shop window displays, the clocks and watches made by Smiths English Clocks, Ltd., are always shown with the hands at 9·23. The reason for this is that the hand arrangement allows the name "Smiths" to be seen readily, and it does not become confused in pattern with the winding holes. Further, the presence in a shop window of several clocks with the same timing adds to the general attractiveness.

Fluorescents for Schools

AT the present time considerable attention is being devoted to the question of schools, the provision of additional ones, and in particular the increasing costs of the existing premises. There have been instances where the increased burden of building costs has been used to justify the reduction of lighting costs at the expense of lighting effectiveness. Such a move is to be deprecated. To combat these efforts, E.L.M.A. has produced a "Memorandum on Fluorescent Lighting in Schools," which emphasises the need for proper lighting and gives examples of the costs of different types of installations. It should be studied by all who are concerned with the provision and running of schools.

Plastics on Show

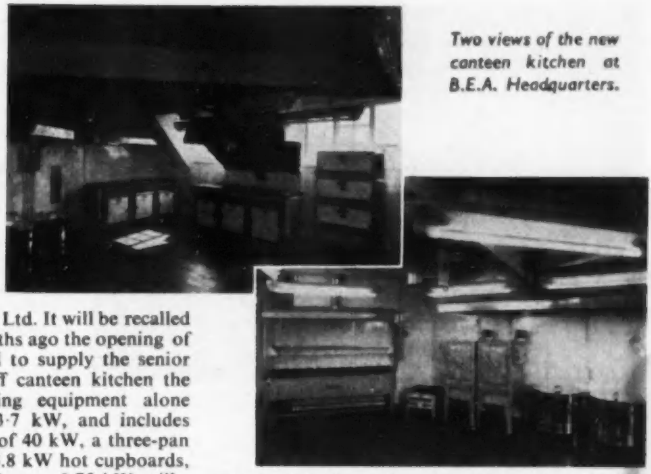
THE National Hall, Olympia, is to be the scene of the British Plastics Exhibition and Convention, to be held next year from June 6-16—during the period of the Festival of Britain. Claimed to be the first of its size and kind, the exhibition is intended primarily for the trade, but will also be open to the public. Exhibitors are confined to British and Commonwealth firms who produce, mould or fabricate plastics materials or supply raw materials or equipment to the industry.

To run concurrently with the exhibition, a convention is being organised, to be held in a hall seating 750, which adjoins the gallery of the Exhibition Hall. Here, technical lectures are to be given in addition to public film shows. The convention is being organised by a committee on which are represented the British Plastics Federation, the Plastics Institute, and the Plastics and Polymer Group of the Society of Chemical Industry.

E.D.A. and the Food Fair

AT the "Food Fair" which opens at Olympia next Tuesday, the Electrical Development Association will have a well-fitted stand where visitors will be able to see many of the unusual gadgets such as thermocouple skewers for testing temperature of the inside of a joint, etc., as are used by Mr. Philip Harben, the B.B.C.'s senior television chef in his own demonstration at Alexandra Palace. In addition to a representative display of electric equipment, modern cooking appliances will be shown in action.

Another Kitchen at B.E.A. Headquarters



Two views of the new canteen kitchen at B.E.A. Headquarters.

TO cater for between 800 and 900 people at the headquarters of the British Electricity Authority, a new canteen has recently been opened. The opportunity has been taken to include the latest types of electrical equipment, most of which have been supplied by the Jackson Electric Stove Co. Ltd. It will be recalled that we recorded some months ago the opening of a smaller kitchen intended to supply the senior officials. In this new staff canteen kitchen the heavy duty electric cooking equipment alone has a total loading of 223·7 kW, and includes two Jackson cookers each of 40 kW, a three-pan fish fryer of 24·3 kW, two 8.8 kW hot cupboards, one 10 ft and the other 5 ft, two 8·75 kW grills, a three-deck pastry oven of 11·8 kW, three 30-gal. boiling pans each of 9·2 kW, and two steaming ovens. There is also a 4 ft by 2 ft open-type bain marie of 10 kW, and a 29-ft long hot cupboard service counter with stainless steel bain marie top and fitted with tray slide, having a loading of 30 kW. Among the other equipment is a Dawson Deluge crockery washing machine, two cafe sets by Jackson Boilers Ltd., and a mixing machine, potato chipper, slicer and potato peeler made by Peerless and Ericsson Ltd. The preparation tables, pastry benches and stainless steel sink units have been supplied by J. Farquharson and Sons Ltd.

Advanced Engineering Courses

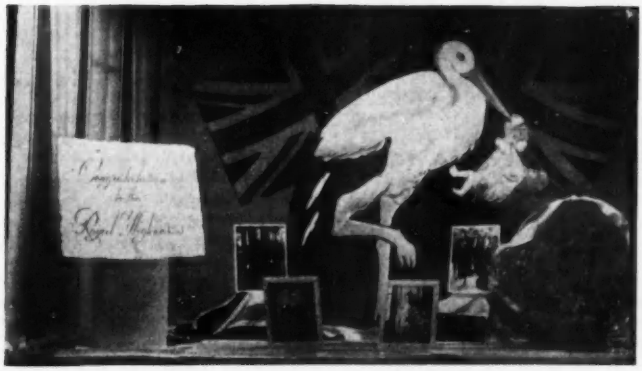
DETAILS of the post advanced lectures in electrical and mechanical engineering are now available from the Manchester and District Advisory Council for Further Education, Education Offices, Deansgate, Manchester 3. These lectures, which cover a wide field, are to be delivered at the Royal Technical College, Salford and the College of Technology, Manchester. Details are also available of the Post Advanced Courses in Engineering being given at the technical colleges in the area for the session, 1950-51.

Those interested should apply to the Honorary Secretary of the Council at the address given above.

British Association Exhibition

UNESCO'S 1950 theme of "Energy in the Service of Mankind" is illustrated by an exhibition staged in the Department of Mechanical Engineering of Birmingham University. Arranged in connection with the British Association's annual meeting, it was opened by Sir Harold Hartley, F.R.S., on Monday, and will be available to the general public from August 21-29 and from September 7-9.

In his speech, Sir Harold acknowledged the help that had been given by the National Coal Board, the Gas Council, and the British Electricity Authority, which had brought the exhibition up to date and made it worthy of the occasion. The history of energy in the past 2,000 years is covered, and some possibilities of the future are suggested. Among the exhibits of direct electrical interest are the first electroplating machine, examples of various gas turbines and a fuel cell.



This up-to-the-minute window display at the Colston Avenue, Bristol, service centre of the South Western Electricity Board, in honour of the birth of the Princess, aroused considerable interest. Both pink and blue drapings were held ready!

A striking landmark—Totnes castle floodlit

British Trade Abroad

CLOSELY following a contract for 220 kV transformers for the Roxborough power station, New Zealand, Ferranti, Ltd., have now obtained a second large order from the State Hydro-Electric Department for 13 additional transformers for the new Whakamaru power station in the North Island. These latter are each of 9,259 kVA, single phase generator transformers for forming four 27,777 kVA, 3-phase banks, ratio 11-220 kV, with one single-phase unit as spare.

Large orders, totalling about £400,000, have also recently been obtained by Ferguson Pailin, Ltd. This firm is to supply 23 high voltage circuit breakers for the Damodar Valley Corporation, to be used in connection with the electrification and industrial development of the Bihar region of India. The other order is for high voltage switchgear for the Athens Piraeus Electricity Co., Ltd., and is valued at more than £200,000.

Last week, the Seattle City Council, U.S.A., awarded a contract, worth $370,000, to the American General Electric for two power transformers, rejecting the bid of Ferranti, Ltd., at $23,200 on the ground that the British firm could not meet delivery date requirements. The undertaking specified that one transformer must be delivered within 300 days and the second within 320 days.

In connection with the power supply expansion scheme of the Electricity Supply Commission of South Africa, to which we referred last week, Metropolitan-Vickers Electrical Co., Ltd., have on order two 30,000-kW 3,000 r.p.m. turbo-generator sets for the Salt River No. 2 Station, Capetown. The turbines are designed for initial steam conditions of 600 p.s.i.g., 900° F., and a vacuum of 29·0 in.Hg. at the economic rating of 24,000 kW. Two-cylinder construction will be employed, with 23 impulse stages. Four-stage feed heating will provide a final feed temperature of 340° F. at the economic rating. The turbo-generators are to be wound for 11 kV. They will be air-cooled with closed-circuit ventilation the direct-connected exciters running at 3,000 r.p.m.

Totnes Celebrates

A WELL-KNOWN sight to visitors to Devon, the ancient castle at Totnes, together with other monuments, are being specially floodlit to celebrate the town's 1,000 years of existence as a "burgh". The floodlighting was recently inaugurated by the Mayor of Totnes, Councillor C. S. Jacka. All arrangements for the lighting display were made and the equipment loaned by the South Western Electricity Board. The floodlighting will go on until September for the benefit of visitors.

Finish Them Off

WEDNESDAY of next week sees the opening of the first National Industrial Finishes Exhibition at Earls Court. There are to be about fifty trade exhibitors who will show the latest examples of their products in this important branch of manufacture. On the stand of the Council of Industrial Design will be seen examples of good and bad finishing of domestic equipment and machinery. Jenson & Nicholson Ltd. will exhibit a variety of industrial finishes arranged to show the main industries served, and the types of enamels, lacquers, paints and varnishes most suited for particular purposes. The Electrical Industry is symbolised by a model heavy duty motor, the various insulating and impregnating varnishes being indicated. The Lewis Berger group, too, will be exhibiting a new white stoving enamel known as Polykem 222, whose main use is where the greatest reflection of light is necessary, such as reflectors of tubular and other electric light fitments. The exhibition will be open daily till September 7, from 11 a.m. to 6.30 p.m., extended to 9.30 p.m. on Wednesdays and Saturdays.

NEWS IN BRIEF

The annual carnival dance of the Birmingham branch of the E.I.B.A. will be held at the Magnet Club, G.E.C. Works, Witton, on October 6. Details from L. Wall, hon. secretary, 102 Snow Hill, Birmingham.

"The Marconi Companies and Their People" is the title of the new house magazine dealing with the interests of Marconi's Wireless Telegraph Co., and Marconi Instruments, Ltd., the first issue of which is to hand.

At the Salford Works of Frederick Smith and Co., and Vactic Wire Co., Mr. W. J. Terry, chairman and managing director, recently presented a long service medal and savings tokens to 113 employees who had completed 25 years or more service.

The Association of Electrical Housecraft Advisors has inaugurated a "Bulletin" to enable the easy exchange of ideas and experiences.

Electric Supply News

Bold

The B.E.A. has received the consent of the Ministry of Fuel and Power to the construction of the second half of the new power station at Bold, near St. Helens, Lancs. The authorisation covers two 30 MW turbo-alternator sets, two boilers each of an evaporative capacity of 300 k lb/hr and one cooling tower. Official consent to the establishment of the station and the installation of the first section was given last May. The station when completed will have a total installed capacity of 120 M.W

Eastern Board

An analysis of the operations of the Eastern Electricity Board for the first quarter of the current financial year shows that the Northmet Sub-area, as might be expected, has returned the best figures for cookers, water heaters and units sold, for contracting work and sales of fittings, etc., and in respect of the number of new consumers connected. The table given above, breaks down the results into the sub-areas.

EASTERN BOARD'S DATA FOR EACH SUB-AREA

	Chilterns	Essex	Fens	Norfolk	Northmet	Suffolk	Totals
Units purchased (millions) ...	191·562	179·045	60·222	87·031	327·325	82·369	927,554
Consumers connected... ...	1,542	2,831	1,709	1,494	3,566	1,698	12,840
H.V. mains extended (miles)...	10·3	24·8	14·5	24·1	20·2	17·2	111·1
L.V. mains extended (miles) ...	16·2	30·5	23·1	22·8	21·7	26·7	141·0
Total value of contracting work, sales of fittings, appliances, etc.	£131,414	£129,499	£129,763	£152,440	£340,971	£135,295	£1,019,382
No. of cookers sold	1,194	1,376	976	1,750	1,811	1,289	8,396
No. of water heaters sold ...	395	547	205	158	785	278	2,368

Hereford

The Corporation has agreed that, subject to the approval of the Minister of Health, electric cookers are to be provided in each unit of accommodation at Foxley Camp, by the Midlands Electricity Board, at a cost of £6,930.

Malvern

The Minister of Fuel and Power has decided not to give consent to overhead power lines across Malvern Hills, as proposed by the Midland Electricity Board, but he is prepared to consider the placing of lines along an alternative route. It will be recalled that a public inquiry on the matter was held on June 7.

South Wales

A total of 33,220 new consumers of all types have been connected by South Wales Electricity Board during its first two years, there being now 459,175 consumers supplied. In the Board's development work, 533 miles of new power lines, including rural, were laid in the two years. The Board has already prepared a development scheme which provides for the erection of primary and secondary distribution lines within a reasonable distance, roughly not more than 1½ miles, of all premises in its area with the exception of those in mountainous ground or other difficult terrain. Under this plan, subject to the limits permitted by Government policy on capital expenditure, etc., it is proposed to put forward programmes setting out the stages of development. In this the consultative council will be invited to co-operate as to the priority of works in each stage and on other points. It is also the Board's policy to change over all supplies to the standard 240 V as opportunities arise, but obviously it is not possible, at the present time, to proceed with any comprehensive scheme.

After discussion of the Board's plans for the development of rural areas, the consultative council, at its meeting last week, passed a resolution urging the South Wales Electricity Board to proceed with the first stage to avoid delay. The chairman of the council, Ald. A. E. Gough, described the Board's proposal to spend £300,407 in two years on rural development as inadequate.

North-Western

Details of the restrictions imposed on the development work of North-Western Electricity Board by the cut in capital expenditure has now been revealed. In the year 1949/50 the Board increased its rate of reinforcement and development work, spending some £1,000,000 more than in the year 1948/49. But for the year 1950/51 the Board will be restricted to an expenditure of some £200,000 less than for 1949/50. In view of this, the Board explains that it is now clear that certain developments originally planned will have to be either curtailed or deferred.

LIGHTING SCHEMES

Coulsdon and Purley U.D.C.—Has authorised the provision of additional lighting installations in Star Lane and on the Star Lane estate at a cost of £802.

Halesowen T.C.—The Street Lighting Committee has reported that 416 points would be needed for lighting all Class 1 roads by electricity, involving the removal of ten existing electric lamps and 241 gas lamps. Total cost would be £25,020. The offer of the Midlands Electricity Board to erect six standards on a trial basis has been accepted.

Company Activities

Albright & Wilson

It is proposed to issue 2,023,164 5% Cumulative Preference £1 shares at par to Ordinary shareholders in the ratio of one for every two Ordinary 5s. stock held.

Christy Brothers (Chelmsford) Ltd.

Group profit for the year to March 31, after all charges including taxation, was £30,472 (*£17,758*), and is wholly applicable to the holding company. U.K. taxation charged is £35,372 (*£17,921*). There is an Ordinary dividend of 6% (*5%*). The group profit includes profits of one subsidiary acquired during the year and the profit for a full year in respect of another subsidiary, whereas the previous year's profits were for nine months only. There is £8,801 transferred in the accounts of a subsidiary to general reserve, the group carry forward being £18,446 (*£3,100*).

North of Scotland

Approval has been given for a further issue of £15,000,000 North of Scotland Hydro-Electric stock to the National Debt Commissioners under Treasury guarantee. It takes the form of a 3½% security at par, carrying redemption dates 1977-80. The proceeds will be applied in repayment of temporary advances from banks, in defraying further expenditure on constructional schemes and for authorised purposes.

Palestine Electric Corp. Ltd.

The profit and loss account for the year ended December 31 shows a surplus on operation and sundry receipts, after charging generation, distribution, administration and London office expense, and after making provision for superannuation funds, of I£1,047,258 (*I£420,303*). Directors' fees absorb I£5,000 (*same*), profits tax I£380,000 (*I£60,000*), Redeemable Cumulative Preference shares sinking fund I£22,572 (*I£21,608*), capital amortisation fund I£9,754 (*same*), depreciation reserve I£334,270 (*I£226,430*), and general reserve I£125,000 (*nil*), leaving balance of I£170,689. With I£240,810 brought in there is I£141,499 available. To Preference dividends I£21,619 (*I£22,156*), and 5% tax free on Ordinary and "A" Ordinary I£101,361 (*I£86,881*), leaving I£288,519 carried forward. The chairman, Viscount Samuel, states that even when the Haifa power house is completed next year with 90 MW of plant, capacity will still be inadequate, and the directors contemplate a further programme of extensions during the next three years.

Pinchin Johnson and Associates

Combined profit, after deducting losses including £15,744 of the South African company in its initial year, including transfer fees and after charging all expenses was £1,344,355 (*£1,370,611*). Add investment income £55,871 (*£74,689*), making £1,400,226 (*£1,446,300*).

Reason Manufacturing Co.

For the year to January 31 last, revenue was £5,145 (*same*). Deduct directors' fees, nil (*£8*), and debenture interest £1,000 (*same*), leaving a balance of £4,145 (*£4,137*), plus £12,784 (*£11,376*) brought in, making £16,929 (*£15,513*) available. To tax £375 (*£791*), Preference dividend £1,663 net (*same*), Ordinary dividend 20% £275 (*same*), leaving £14,616 carried forward.

Thorn Electrical Industries Ltd.

For the year to March 31, consolidated trading profit was £231,738 (*£187,184*). Depreciation and amortisation absorbs £77,175 (*£66,242*), directors' remuneration £11,140 (*£13,630*), provision for additional management remuneration £3,513 (*nil*), audit fee £2,567 (*£2,317*), tax £78,527 (*£53,036*), leaving a net profit of £58,816 (*£51,959*). To general reserve £15,000 (*£11,150*), future tax in respect of relief on initial allowances £10,000 (*nil*), 6% Preference dividend £1,650 (*same*), 5% Second Preference £11,000 (*same*), Ordinary dividend 20% £19,387 (*same*), leaving £37,300 (*£35,521*) carried forward. Group current assets are listed at £1,689,263 (*£1,323,452*), and current liabilities and provisions £962,629 (*£581,247*).

Ultra Electric

Consolidated results for the year to March 31 show a group trading profit of £60,642 (*loss £89,689*). Net special provisions—being further in respect of the previous year—absorb £42,498; last year £146,841 was provided for writing off stocks, etc.

Venner Time Switches Ltd.

The full report shows a profit, after providing for all charges including depreciation, of £14,828, to which is added £11,479 brought in, making £26,307. Income tax absorbs £2,168, profits tax £1,350, and Cumulative Preference dividends £1,320, leaving £21,469. The recommended dividend of 5% takes £5,490, leaving £15,529 carried forward. In his report, Mr. A. A. Rowse, the chairman, states that the new electric storage battery has been standardised in a range from ½ to 48 Ah. Applications have already been made to deaf aid sets, to aircraft, to miners lamps and the photographic industry. In due course the battery should prove a valuable addition to the manufacturing range.

Dividends Declared

Automatic Telephone and Electric. Interim dividend of 3% (*same*), payable on September 30.

Chloride Electrical Storage Co. Interim dividend of 5% on "A" or "B" Ordinary stock, payable on October 1. This is the same as the previous year, but is payable on a double Ordinary capital following the free bonus issue last November.

English Electric Co. Ltd. Interim Ordinary dividend of 4% (*same*) on increased capital, payable on September 15.

Commercial Information

CONTRACTS OPEN

HOME

Aug. 26.—Gateshead T.C. Supply of electric lamps. Borough Treasurer and Purchasing Officer, "Bloomfield," Durham Rd., Gateshead 9.

Aug. 26.—Ware (Herts) R.D.C. Re-wiring of electric lighting installations in 53 houses. Engineer and Surveyor, Priory, Ware. Deposit £1 1s.

Aug. 26.—Swinton and Pendlebury T.C. Concrete columns, bracket arms, wiring, lanterns, lamps and auxiliary equipment for lighting 2·08 miles of the Manchester-Chorley (A6) Road. Borough Engineer and Surveyor, Town Hall, Swinton, Lancs. Deposit £2 2s.

Aug. 28.—Denbighshire C.C. Electric lighting installation for canteen kitchen and dining-room at Llanrwst Grammar School. Apply to County Architect, Grove Park, Wrexham, by Aug. 23. Deposit £3. (See August 10 issue.)

Aug. 28.—Bradford T.C. Electrical installation to 36 houses on Eccleshill (South) site. City Architect, Town Hall, Bradford.

Aug. 28. — Dundee Harbour Trust. Supply of electrical fittings for six or twelve months. A. Smith, general manager and engineer, Harbour Chambers, Dock Street, Dundee.

Aug. 28.—Marshland (Cambs.) R.D.C. Wiring 38 houses in various parishes. S. G. Bailey, Architect, Council Offices, Alexandra Park, Wisbech.

Aug. 28. — Northern Ireland Govt. Electrical installation at "D" Factory, Donegall Road, Belfast. Apply to the Ministry (Room 103), Law Courts Building, May Street, Belfast.

Aug. 29.—Merton and Morden (Surrey) U.D.C. Improved stage lighting, etc., at Merton Public Hall. Engineer's Office, Morden Hall, S.W.19.

Aug. 30.—Dublin. (*a*) Two (or three) 6-ton electric portal wharf cranes, and (*b*) two 10-ton electric portal wharf cranes for Dublin Harbour. Engineer's Office, Dublin Port and Docks Board, East Wall Road, Dublin. Deposit £5.

Aug. 30.—Hull T.C. Electrical installations to West Dock Avenue school, Charterhouse Lane school and Sulton School for the Deaf. Separate contracts. City Architect's Dept., Guildhall, Hull. Deposit £1 1s. for each contract.

Aug. 30.—Huntingdon T.C. Wiring 6 houses at Great Raveley for R.D.C. Surveyor, Montagu House, Huntingdon.

Aug. 30.—Newcastle. Repair and maintenance of electric lighting on various housing estates. City Architect, 18 Cloth Market, Newcastle-upon-Tyne 1.

Aug. 31.—Kirkburton (Yorks) U.D.C. Wiring 28 houses. D. J. D. Woodhall, Engineer, Town Hall, Kirkburton.

Aug. 31. — Dagenham T.C. Various lengths of 660 V and 250 V underground cable, v.i.r., etc. Borough Engineer, Civic Centre, Dagenham.

Aug. 31.—Dublin T.C. Two thousand street lighting fittings. City Engineer's Department, 28 Castle Street, Dublin.

Aug. 31. Worthing R.D.C. Electrical installations in 40 houses at Addison Square, 24 at Grinstead Avenue and 15 at Wenceling Cottages, Lancing. Housing Manager, 15 Mill Road, Worthing. Deposit £1 1s.

Sept. 1.—Belfast T.C. 33 kV main cables, auxiliary cables, and accessories for stage 1 of the 33 kV distribution system extensions. Merz and McLellan, consulting engineers, Carliol House, Newcastle-upon-Tyne 1. Deposit £5 5s. (See July 27 issue.)

Sept. 1.—Edinburgh T.C. Electric light and power installation at Heriot-Watt Mining College, Grassmarket. Ref. E.120, City Architect, City Chambers, Edinburgh.

Sept. 2. — Irvine T.C. Lighting equipment and concrete pillars for installation of sodium lighting on trunk road A78. Burgh Surveyor, "Heathfield," Kilwinning Road, Irvine.

Sept. 2.—Sutherland C.C. Electrical work in 26 houses at five sites. E. W. Brannen, architect, Carnegie Buildings, Dornoch.

Sept. 4.—Bury T.C. Electrical installation for lighting, power, etc., at Elton county secondary modern school. Borough Engineer, Town Hall, Bury. Deposit £2 2s. Advertised in this issue.

Sept. 4.—Sunbury-on-Thames U.D.C. Wiring and equipping for electric lighting of (*a*) 34 houses at Sutherland Avenue, and (*b*) 28 houses and bungalows at Nursery Road and Nursery Gardens. Architect and surveyor, Council Offices, Sunbury-on-Thames.

Sept. 6.—Dublin. New electric lift at St. Bricin's Hospital, J. Tyrrell, Secretary, Office of Public Works, Dublin.

Sept. 6.—Prestwick T.C. Twenty-seven 140-W sodium vapour discharge lamps, with lanterns, reinforced concrete columns, etc. Borough Engineer, Town Hall, Prestwick. Deposit £2 2s.

Sept. 7.—Worcestershire. Supply of kitchen equipment and household requisites for home for aged people. County Welfare Officer, County Buildings, Worcester.

Sept. 8.—Darlaston U.D.C. Installation of electric light and power in 145 pre-war council houses. Engineer and Surveyor to the Council, 49 Church St. Deposit £2 2s.

Sept. 8. — Bournemouth T.C. Vehicle-actuated traffic signals at Cemetery Junction. Borough Engineer, Town Hall, Bournemouth. Deposit £1 1s.

Sept. 9.—Middlesex C.C. Supply of electric lamps for twelve months from Nov. 1, 1950. Chief Supplies Officer, 25 Victoria Street (South Block), Westminster, S.W.1. Advertised in this issue.

Sept. 11.—Enfield U.D.C. For (*a*) 128 lanterns for 400 W h.p.m.v. lamps with control gear and fuses; and (*b*) for 128 reinforced concrete columns, 25 ft high, and fixing of lanterns. Frank Lee, Engineer and Surveyor, 7 Little Park Gardens, Enfield. Deposit £1 on each. Advertised in this issue.

Sept. 12.—Dublin T.C. Three 300 A and two 400 A electric arc welding machines, and one

diesel-engined 300 A electric arc welding unit. J. Tyrrell, secretary, Office of Public Works, Dublin.

Sept. 12.—Musselburgh. Electrical work at Wedderburn House, Inveresk. County Architect, 32 Palmerston Place, Edinburgh 12.

Sept. 13.—Brockhall. Supply of electric lamps for 12 months from Oct. 1, for Hospital Management Committee. H. Lindsay, Secretary, Brockhall Hospital, Langho, Blackburn.

Sept. 15.—Heywood T.C. Electric paper-baler and over-band magnetic separator for destructor works plant at Peel Lane. W. R. Parker, Town Clerk, Municipal Buildings.

Sept. 15. — Norwich T.C. Two hydro-pneumatically controlled, electrically driven pumping sets. Engineer and Manager Water Department, City Hall, Norwich.

Sept. 16. — Newcastle - upon - Tyne. Electric lighting installation at Benton Park Primary School. Apply to H. V. Lightfoot, director of education, City Education Office, Northumberland Road, Newcastle-upon-Tyne, by Aug. 25. Deposit £5 5s. (See Aug. 17 issue.)

Sept. 18.—Salford T.C. Electrical installations at 4 shops, 4 maisonettes and 259 flats at Ladywell, Eccles New Rd., Salford. City Engineer, Town Hall, Bexley Square, Salford 3. Advertised in this issue.

Sept. 20.—Tyne Improvement Commission. Five 10-ton electric grabbing cranes; also 1,400 ft of twin conveyor-belt lines capable of handling 2,000 tons/hr. J. K. McKendrick, Secretary, Commission Offices, Berwick Street, Newcastle-upon-Tyne. Deposit £5 5s. each.

Sept. 25.—Littlehampton U.D.C. Electrical installations in 18 houses at Wickbourne. Engineer and Surveyor, Council Offices, Littlehampton. Deposit £1 1s.

Oct. 18.—Metropolitan Water Board. Two sets of electrically driven well and surface pumps for Chingford Mill pumping station, Hall Lane, Chingford. Chief Engineer's Department (Room 235), Offices of the Board, New River Head, Rosebery Avenue, E.C.1. Deposit £1 1s.

No date stated.—Fife T.C. Electric lighting at Springfield School. Also heating and electrical work for Markinch Junior Secondary School. Surveyors: R. Galbraith and Lawson, 21 Crossgate, Cupar, Fife.

No date stated.—Kirkcaldy T.C. Electrical work in 89 maisonettes, flats and 3-storey houses at Winifred Crescent. Apply to J. Gentles and Son, 162 High Street, Kirkcaldy.

No date stated.—Leslie T.C. Electrical work in 16 houses at Mansfield. Apply to A. D. Haxton and Watson, Architects, Leven.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

Sept. 1.—Pakistan. Lengths of paper-insulated cable, l.c. 660 V, conforming with Govt. Specification H61E, B.S.S. 480. B.o.T. (Ref. CRE (IB) 61947/50).*

Sept. 1.—Mozambique. Intercommunications system including loudspeakers, amplifiers, etc. for Salazar Secondary School in Lourenco Marques. Tenders must be submitted through Jacques Sahn and Co. Ltd., P.O. Box 93, Lourenco Marques, or Entreposts Comercial de Mocambique, S.A.R.L., P.O. Box 107, Beira. B.o.T. (Ref. CRE (IB) 61982/50).*

Sept. 20.—Umtali, S. Rhodesia. 24 single-phase, 5 A, 220/230 V house service meters; 18 5 VA primary current transformers up to 660 V; automatic circuit breakers; 48 200 A h.r.c. fuse handles and boxes, and 200 h.r.c. fuses from 80 A to 200 A; one sub-standard test meter, single phase, 50 c/s, 220/230 V. Contract E.13/1950. B.o.T. (Ref CRE (IB) 61804/50).*

Sept. 20.—Umtali T.C., S. Rhodesia. 2,000 lb cable jointing compound, 2,000 small glazed insulators, 5,000 40 W and 1,000 200 W lamps, 4,000 line taps, 1,300 sockets from 100 to 500 amps, 4,000 cable sleeves, insulating tape and wire (P.V.C. insulated). Contract E14/1950. B.o.T. (Ref. CRE (IB) 61807/50).*

Oct. 3.—Tangier. Two diesel-driven 2,500 kW, 6,000 V, 50 c/s, 3-phase alternators, for the State Water and Electricity Services of the International Administration. B.o.T. (Ref. CRE (IB) 60486/50*).

Oct. 18.—Umtali T.C., S. Rhodesia. Street lighting equipment: 150 radial wave street

Your Queries — Answered

"Triumph" fuse units, makers of? T.E.—Castle Fuse and Eng. Co., 31a/35 Castle St., Liverpool 8. (18613)

"Jackson" soil heating equipment, makers of? T.E.—S. B. Jackson, 12 Rampayne Mews, S.W.1. (18618)

"Bara" stills, makers of? T.E.—Baird and Tatlock (London) Ltd., 14 Cross St., E.C.1. (18623)

"Hirae" panel heaters, makers of? T.E.—Dulrae Ltd., 10 Brockett Close, Welwyn Gdn City. (18627)

"Herculacker" wire, makers of? T.E.—Concordia Electric Wire Co. Ltd., Long Eaton, near Nottingham. (18641)

"Duocold" refrigerators, makers of? T.E.—Deepfreeze Refrigeration Ltd., 193 Baslow Rd., Totley, Sheffield. (18646)

"Graham" and "Triton" bells, makers of? T.E.—Alfred Graham and Co. Ltd., Caxton House, Tothill St., S.W.1. (18650)

"Ibis" laundry equipment, makers of? T.E.—Isaac Braithwaite and Son, Engineers, Ltd., 200 Upper Thames St., E.C.4. (18655)

"Westinghouse" irons, supplier of spares? E.B.—Refrigeration Service (South London) Ltd., 40 Upper Richmond Rd., S.W.15. (18659)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

Vacuum cleaner stamped P.B. Domestic Appliances, Birmingham, supplier of spares for? (18664)

light lanterns with 18-in. vitreous enamel reflectors, 50 with G.E.S. and 100 with E.S. lampholders, 45 side entry horizontal controlled cut-off enclosed lanterns for 400 W mercury vapour discharge lamps, 60 weatherproof pole mounting control boxes. Contract E9/1950. B.o.T. (Ref. CRE (IB) 61805/50).*

Oct. 18.—Umtali T.C., S. Rhodesia. Six l.t. substation H.R.C. switchboards, 400 V, 3-phase, 50 c/s, comprising a 500-amp link unit, sheet steel metering panel with three 5-in. dial ammeters, and four 3-phase, 300-amp distributor units. Contract E8/1950. B.o.T. (Ref. CRE (IB) 61802/50).*

Oct. 18.—Umtali T.C., S. Rhodesia. Six 150 kVA 3-phase, 50 c/s, oil immersed, naturally cooled, double wound, core type transformers for indoor service. One 50 kVA 3-phase, 50 c/s for outdoor use. Contract E7/1950. B.o.T. (Ref. CRE (IB) 61800/50).*

Oct. 18.—Umtali T.C., S. Rhodesia. Six ring main units, two isolators, and a 400-amp manually operated 11,000 V oil circuit-breaker, 150 MVA. Also two "Tee-off" ring main units. Contract E10/1950. B.o.T. (Ref. CRE (IB) 61801/50).*

Oct. 31.—Bloemfontein T.C. One turbo-alternator, condenser and auxiliary apparatus. Merz and McLellan, 1,419 Escon House, Rissik St., Johannesburg. Deposit £2 2s.

Nov. 4.—Egyptian Govt. One 25,000 kW turbo-generator (or two units totalling the same power) and two boiler units complete with auxiliary switchgear and transformer, for Cairo North station. Chief inspecting engineer, Egyptian Government, 41 Tothill Street, London S.W.1. Fee £25 12s. 6d.

Nov. 7.—Wellington (N.Z.). One 50 MVA 220/110/11kV transformer bank and spare unit, comprising four auto-transformer units, each 16,667 kVA 127/63·5/11kV, oil immersed and water cooled for Roxburgh power station. Contract No. 158, State Hydro-Electric Dept., Wellington. Deposit £100. B.o.T. (Ref. CRE (IB) 61858/50).*

CONTRACTS PLACED

Northampton T.C. Electrical installation to 72 houses for R.D.C. F. T. Lovell and Co. Ltd. £1,847.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	202 0 0	£160-196
Delivered in 2nd and 3rd month after order	203 10 0	—
Delivered in 4th, 5th and 6th month after order	2.5 0 0	—
LEAD, good soft pig (foreign)	112 0 0	112 0 0
" " " " "English" quality	113 10 0	—
Delivered in 2nd and 3rd month after order, plus	1 0 0	—
TIN (99·99·75%) (Cash)	815-82	—
" (3 months)	815-820	—
ALUMINIUM, commercial purity (del.)	112 0 0	—
ZINC	127 10 0	12J 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	43 5 0	—
Mild Steel Tape (0.04 in.)	26 0 0	—

Seaham (Durham) U.D.C. Electrical installation to 82 houses on Westlea Estate. J. Calvert of Seaham.

Houghton-le-Spring (Durham) U.D.C. Wiring of 54 houses on the Fence Houses site. B. L. Oliver of Birtley.

Morpeth T.C. Electrical installation in 57 houses in Spelvit Lane. J. and A. Oliver of Ashington.

Longbenton U.D.C. Electrical installation in 76 houses at Crossley Terrace, 30 on the Fordley Estate and 136 at Dudley. J. G. Patton.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Riley Clock and Instrument Co. Ltd. Resolution for voluntary winding-up passed at a meeting on August 11. Mr. Denys Quinton Holland of Crown House, Aldwych, W.C.2, appointed liquidator.

G. T. Western Ltd. Meetings of members and creditors at 76 New Cavendish Street, W.1, at 11.30 a.m. and 12 noon respectively on September 15.

Partnership Dissolved

Fulham. Ronald George John Martin, Ronald Charles Slater and Allan Lamb Ritchie trading as Martin Slater Radio at 46 Greyhound Rd., Fulham. Debts dealt with by R. G. J. Martin and R. C. Slater who are continuing the business.

BANKRUPTCY ACTS

Receiving Order

Wigan. Bannister, John, electrical contractor at 2 The Wiend, Wigan. Date of receiving order, August 15, 1950.

Application for Discharge

Salford. Baldwin, Charles John, electrical fitter of 212 Barton Road, Stretford. Hearing fixed for Sept. 8, 1950.

Trustee

Brighton. Davidson, Reginald, company director, carrying on business as electrical illuminating engineer, at 199 High Street, Lewes. Trustee appointed: Bradley-Hole, John Sidney, of 6 and 7 Old Steine, Brighton 1.

Companies Winding-Up

George Franks & Co. (Guildford) Ltd., 78 Woodbridge Road, Guildford, Surrey, motor mechanics, electrical engineers, etc. At the first meeting of creditors held recently, the Official Receiver reported that the winding-up order was made on July 3. No statement of affairs was filed, but upon present information the liabilities comprised amount due to a hire-purchase firm £600, less £450, being the estimated realisable value of plant held; debenture, £4,000; charge on company's premises, £150; trade creditors, £1,200; directors unsecured loans, £5,000; and another unsecured loan £300. The assets were said to be land and buildings (£400) and book debts (£40). A representative of the debenture holder and also of the directors intimated the debenture holder and the directors would not press their claims. The directors attributed the failure of the company mainly to considerable expenditure in wages and other outgoings in connection with a mild steel electric motor in which the company was interested; and lack of receipts from other activities or sales during the period from September, 1947, to mid-1948. The Official Receiver said that in his opinion the creditors of the company should have been informed of the unsatisfactory position in 1948. The matter was left in the hands of the Official Receiver as liquidator.

BUSINESS PROSPECTS

HOME

Aireborough U.D.C. Erection of 26 houses on the Bolton House housing estate, Yeadon. F. Tunnell, Engineer and Surveyor, Council Offices, Micklefield House, Rawdon, Nr. Leeds.

Aldridge U.D.C. Erection of 19 houses at Wood Lane, Pelsall. Thomas H. Partridge, Clerk to the Council, Council House, Aldridge.

Barnstaple T.C. Approved reconstruction of two tiers of Albert Hall. Estimated cost £25,000.

Bathavon R.D.C. Erection of 26 traditional houses at Batheaston and 18 at Whitchurch. H. H. Goldsmith, Council's architect, 18 Gay Street, Bath.

Bootle T.C. Erection of one block of 3-storey flats. Borough Surveyor, Town Hall.

Bournemouth. T.C. approved plans for erection of departmental store for J. E. Beale Ltd., 163-7 Old Christchurch Rd. Jackson and Greenen, Architects, Hinton Buildings, Hinton Rd.

Billingham-on-Tees. U.D.C. is to erect 16 houses on a site east of John Whitehead Park.

Brandon (Durham) U.D.C. has approved plans for erection of 92 houses in Sawmill Lane.

Cambridge. Erection of infants' and junior school. Borough Surveyor, The Guildhall.

Caterham and Warlingham (Surrey) U.D.C. proposes the conversion of street lighting from gas to electricity.

Chester. Adaptation and alterations to homes for elderly persons at Cheadle Hulme and Congleton. Erection of primary school at Crewe, Middlewich Street. Completion of New County Offices, Chester. E. Mainwaring Parkes, County Architect, The Castle, Chester.

Chesterfield. Erection of three-storey block of 18 flats at Highfield estate. Surveyor, Town Hall.

Cleethorpes. Lindsey C.C. approved the erection during current year of an infants' school at Queen Mary Avenue, at estimated cost of £44,000.

Clowne R.D.C. Erection of 20 houses at Bakestone Moor, Whitwell. J. Haslam and Sons, Ryton Chambers, Newcastle Avenue, Worksop.

Cumberland. M. of E. approved 1950 school building programme which comprises a two-form entry infants' school and junior school. Estimated cost £99,274.

Cumberland C.C. Tenders being obtained for the erection of 12 houses for members of the council staff at Wetheral. Plans by County Architect, Portland Square, Carlisle.

Durham. Erection of 16 bungalows on Sunderland Rd. estate. City Engineer's Office, Town Hall.

Eastbourne T.C. Erection of 14, 8, 12 and 18 houses in Brodrick Rd., 12 flats in Bourne St. and 4 houses in Firle Rd. Separate tenders. Borough Engineer, 2/4 Saffrons Rd.

Edinburgh. The erection of two primary schools at Moredun Park school, £120,000, and Southhouse Crescent, £160,000, and air terminal offices for British European Airways, £3,500, has been approved by Dean of Guild Court.

Ennerdale R.D.C. Erection of 250 houses at Distington. Housing estate at Lowca and at Egremont is proposed.

Exmouth U.D.C. Reorganisation of Dotton pumping station, and installation of new pumping and chlorination plant. G. H. Hill and Sons, 51 Mosley Street, Manchester 2.

Gillingham. T.C. is to invite tenders for erection of 19 shops in one block with 25 maisonettes and 4 flats above, on the East-court-Twydall estate.

Glasgow. E.C. approved plans for erection of secondary school at Knightswood, at an estimated cost of £380,000.

Goole. T.C. has approved the erection of 75 houses.

Guisborough (Yorks) U.D.C. Erection of 100 houses (the first instalment of 400 houses) in two contracts of 50. Garbutt, Archibald and Archibald, Architects, 23/25 Albert Rd., Middlesbrough.

Hartlepool. A scheme is being prepared by the Borough Engineer (R. H. Snowball) for the building of ten shops (instead of nine as originally proposed) at West View. The M. of H. is to be asked to approve the work.

Haverfordwest (Pembrokeshire) R.D.C. Erection of 134 houses on 12 sites. W. D. Hill, clerk, 10 Picton Place, Haverfordwest.

Hemsworth R.D.C. Erection of 30 houses and 6 bungalows at South Elmsall, and of 10 houses at Great Houghton. S. Price, Engineer and Surveyor, Brierley Hall, Brierley, Nr. Barnsley.

Hendon. Conversion of Victoria Civic Restaurant building, Bell Lane, to offices for Borough Council. Borough Engineer, Town Hall.

Heywood. Erection of 40 houses at Rose Hill St. A. Middleton, Borough Engineer and Surveyor, Municipal Buildings.

Huddersfield T.C. Erection of 54 semi-detached houses on Dalton estate. Also erection of 20 police houses. Alterations and adaptation of "Ash Villa," Wood Lane, Ashenhurst, into a children's home. Separate tenders. S. M. Richmond, Borough Architect, High St. Buildings.

Ilford. Erection of 54 flats in three blocks on Maypole estate, Barkingside, and of 57 flats in four blocks at Mossford Green, under separate contracts. Borough Engineer and Surveyor, Town Hall, Ilford.

Leeds. Regional Hospital Board invite tenders for alterations and adaptation at Fulford Hospital, York. Alterations to X-ray and theatre hut and covered way at the General Hospital, Otley. Also extensions to the operating theatre at Royal Bath Hospital, Cornwall Road, Harrogate. Architect to the Board, 29/31 Eastgate, Leeds 2.

Manchester. Welfare Services Committee invite tenders for alterations and adaptations at Forrest Hill, South Downs Rd., Bowdon. City Architect, Town Hall.

Newbury T.C. Erection of three pairs of houses at Shaw Estate. Estimated cost, £8,440.

Nottingham. City Council has approved the erection of 162 houses and 12 garages on the Strelley estate and 32 houses in Strelley Rd., at an estimated cost of £281,013.

Sutton-in-Ashfield U.D.C. Tenders are to be invited for erection of 166 houses at Mansfield Rd.

OVERSEAS

Canada. Bach-Simpson Ltd., 71 Carling Street, London, Ontario, manufacturers of panel instruments, wish to secure the agency of a British manufacturer of switchboard instruments and electrical relays.

Kabul, Afghanistan. Material for telephone systems. Porcelain insulators, channel brackets, magnetable telephones, dry cells, copper wire, current generator plant, 24 V accumulator, underground cable, terminal boxes, signal lamps, fuses. Foreign Relations Directorate of the Ministry of Communications, Kabul.

Newfoundland. City Service Co. Ltd., Admiralty Building, Water Street, St. John's, Newfoundland, want quotations and literature for refrigerators. Also goods covering whole range of wire and cable for domestic and industrial work, including insulated wire flex, fittings, switches and power-control panels.

Canada. Kelvinator of Canada Ltd., London, Ontario, manufacturers of refrigerators, and Refrigeration Supplies Co. Ltd., are to form a new import company and want to hear from manufacturers of hardware lines and automotive products.

TRADE NOTES

Change of Address.—As from August 28 the address of the Hirst Electrical Co. and Hirst Electronic Development Ltd., will be: Dermody Road, London, S.E.13. Telephone, Lee Green 2041.

The London office of Elexcel Ltd. is now at Strowger House, 8 Arundel Street, Strand, W.C.2. Telephone: Temple Bar 9262.

This week, the offices and retail showrooms of G. E. Wallis and Sons (Electrical) Ltd. have moved to 9 Mill Street, Maidstone (Telephone Maidstone 2015). The company's electrical contracting stores remain at Broadmead Works.

Metal Prices.—As from Aug. 22, the price of electrolytic copper was increased by £16 to £202 per ton, delivered, whilst good soft pig lead went up a further £8 to £112 per ton.

B.E.A.M.A. Contract Price Adjustment Formulae.—For purpose of calculating variations in (*a*) "Rates of Pay", the rate of pay for adult male labour at Aug. 12, 1950, shall be deemed to be 115/-; (*b*) "Costs of Material", the index figure for Intermediate Products last published by the Board of Trade on Aug. 12 is 287·8 and is the figure for the month of July, 1950.

Indian Batteries.—Steps have already been taken to extend the protection of the dry battery industry in India by extending the duty of 30% *ad valorem* up to December 31, 1951, but the Tariff Board has now suggested that the duty should be extended for a further year. This question the Government will consider in due course, but meanwhile it has been agreed that the control over import of dry batteries should be maintained only so long as such restrictions are necessary, for considerations of foreign exchange.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

E. P. Barrus (Concessionaires) Ltd., Brunel Rd., Acton, W.3. Manufacturers of and dealers in engineering tools, etc. Cap.: £25,000. Dirs.: To be appointed by subs. Subs.: P. A. Barrus, H. F. Barrus.

A. E. Dean and Co. (X-ray Apparatus) Ltd., Progress Way, Waddon, Surrey. Cap.: £50,000. Dirs.: G. P. Dean and Mrs. E. Dean, Streatleigh, Fiddicroft Avenue, Banstead, Surrey.

Evans and Newall Ltd., Primrose Street, New Cross, Manchester 4. To take over the business of girder clip manufacturers and distributors carried on at Manchester by E. M. Evans and Son, Ltd. Cap.: £100. Dirs.: G. L. Morris, W. E. Wood.

Johnson, Smith and Co. Ltd., 349 Coldharbour Lane, S.W.9. Electrical contractors, etc. Cap.: £2,000. Dirs.: To be appointed by subs. Subs.: Jean Herbert and Claire Moore.

Lampton Trading Co. Ltd., 2a Lampton Court, Lampton Rd., Hounslow, Mdx. Manufacturers of and dealers in electrical and mechanical apparatus and accessories, etc. Cap.: £1,000. Dirs.: F. Bridger and A. W. Arnott.

S. Spegelstein & Son, Ltd., 84 Wallis Rd., Hackney Wick, E.9. Metal stampers, general and electrical engineers, etc. Cap.: £5,500. Dir.: S. Spegelstein.

E. Cyril Taylor and Co. Ltd., 1 Robin Hood St., Cheetham Hill, Manchester 8. Electrical, scientific, research, mechanical and constructional engineers, etc. Cap.: £5,000. Dirs.: E. C. Taylor, H. Watson.

Union Electrical Co. (Hull) Ltd., 31 Upper Union St., Hull. Cap.: £500. Dirs.: B. Annis, M. Dubb, and J. Slater.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Bridisco Radio Products with Design 688,754. Class 9. Wireless instruments and apparatus. British Distributing Co., 66 High Street, Hornsey, London N.8.

Cesc 678,077. Class 9. Electrical apparatus and instruments, wireless and television instruments, not including electrical cigar lighters, signals rheostats, generator regulators, irons, coffee makers or wire. Cesco Ltd., 19 The Broadway, High Road, Wood Green, London N.22.

Escalift. 689,160. Class 7. Electrically operated elevating chairs for use in moving invalids or the like from one storey of a house to another. Shepard Elevator Coy., 2413/2431 Colrain Avenue, Cincinnati, Ohio.

Kathard B674,273. Class 9. Electrical apparatus and instruments. Electrical Supplies Co. (Manchester) Ltd., Reliance Works, Viduct Road, Broadheath, Altrincham.

HH Design 680,247. Class 9. Electrical apparatus and instruments for the installation, distribution, switching, controlling and protection of electric circuits. Naamlooze Vennootschap Fabriek Van Electrische Apparaten Voorheen F. Hazemeijer & Co, Tuindorpstraat 61, Hengelo, Holland.

MEETINGS TO NOTE

MONDAY, AUGUST 28

SUBMARINE CABLE CENTENARY.—Exhibition opens at Science Museum, South Kensington, London.

WEDNESDAY, AUGUST 30

INDUSTRIAL FINISHES EXHIBITION.—Earls Court. Till September 7.

BRITISH ASSOCIATION.—Annual meeting. Till Sept. 6. Birmingham.

TUESDAY, SEPT. 5

SCIENTIFIC INSTRUMENT MANUFACTURERS' ASSN.—Annual exhibition and symposium (until Sept. 8). Examination Hall, Queen Square, W.C.1.

WEDNESDAY, SEPT. 6

RADIO INDUSTRY COUNCIL.—Radio and television exhibition (until Sept. 16). Castle Bromwich, Birmingham.

FRIDAY, SEPT. 8.

ELECTRICAL TRADES' COMMERCIAL TRAVELLERS ASSOCIATION.—General Meeting. Feathers Hotel, Broadway, Westminster, S.W.1. 5.30 p.m.

TELEPHONE RENTALS LTD.

A Successful Year. Mr. Fred T. Jackson on the outlook

THE twenty-first annual general meeting of of Telephone Rentals, Ltd., was held on August 21, in London. MR. FRED T. JACKSON, O.B.E., COMP.I.E.E., chairman and joint managing director, presiding.

The following is an extract from his circulated statement.:—

Your directors are very pleased to report a successful year, which has yielded a higher profit than the one reviewed ending December 31, 1948. The profit of the company for the year, before providing for taxation, is £366,475, as compared with £322,034 for the previous year. The various appropriations made from this profit are detailed in the profit and loss account and the income tax charged, amounting to £113,390, includes a reserve based on the profits for the year now under review.

We have debited against our profit the sum of £88,175, representing the writing off of the balance of our goodwill, after having reduced the total by the amount of our free capital reserves.

We have not considered it necessary this year to add to the appropriations of £50,000 which we made last year to a contingencies reserve, nor to the £10,000 reserve for supplemental pension. I should, however, tell you that when the current year ends, that is 1950, we shall most probably pass a further sum to supplemental pensions reserve for the reasons stated in my address to you for the year ending December 31, 1948.

General Reserve

We have transferred a further £20,000 to the general reserve, bringing it up to a total of £320,000. After making these appropriations, providing for the dividends on both the preference and the ordinary shares, and setting aside £34,740 for distribution to employees under the company's profits participation scheme, there remains an unappropriated balance of profit of £67,158 to be carried forward to the current year.

The value of our revenue producing installations has been increased during the year by £356,744, and the reserve for depreciation by £126,341, so that the net total value now stands at £1,803,897. The ratio of our rentals to the net total value of our installations represents approximately 1·75 years' rent.

The profit of the group before taxation is £388,286, and after making the various appropriations, the balance of unappropriated profits carried forward applicable to the holding company's shareholders amounts to £86,454.

Capital Increase

You will doubtless have noted that we propose to increase the authorised ordinary capital by the creation of 2,000,000 ordinary shares of 5s. each. We have no intention of issuing these immediately, but as the business grows it is essential that we should have these available as and when required.

Our reserves now reach a substantial figure, even though we have written off the item of goodwill. These reserves are not liquid but they are employed in the business and, subject to the consent of the Capital Issues Committee, we propose in due course to make a free bonus issue to shareholders of 400,000 ordinary shares of 5s. each, paid up by utilising £100,000 of such reserves.

I should like to emphasise that the business carried on by your company is a highly specialised one and is of such a nature that we need continually to be training executives for the more important positions. Because it is so specialised, we, unlike many other businesses, have no trained reservoir from competing businesses on which to fall back and so are dependent on our ability to attract progressive young men to our organisation for training. It is a business which on the high level administration requires great attention to detail and concentration of thought as to the best way in which we can promote business and industrial efficiency throughout the country.

I do not know if it is generally realised how important are the services we offer to the industrial community as a means of reducing overheads and expediting internal and external transactions in every kind of organisation.

During the year under review we have been successful in obtaining a high average of additional annual rents month by month, so consolidating and improving the stability of the business to such an extent that we can look forward to further success in the future.

Looking forward into 1950, of which over seven months have already expired, the new business secured is very satisfactory and I can safely state that the current year will be at least equal to 1949.

Good Service to Subscribers

Last year at our annual meeting I told you something of our organisation. I need not repeat this, for the organisation I outlined then is still in existence and very little change has been made, apart from minor details where possible weaknesses in service to our subscribers have shown themselves. Good service to our subscribers is, in our opinion, the most important service we can render not only to them, but also to you as shareholders, in the future interests of your company. As an example I might mention that we have a very large number of subscribers in the London and Home Counties areas.

In order to give the best service we are decentralising our organisation in the London and Home Counties area and setting up four areas. In effect, these are four branches, each with a separate manager and chief engineer and staff, all under control of head office. This is something which cannot be done by a stroke of the pen. We believe in going slowly and safely, and one London branch is already operating very successfully within its own area.

You will remember that we opened a subsidiary company in South Africa. This company, too, has been a success right from inception, and already a very substantial rental has been built up in that country. In addition, we have been able to instil into our staff there the same high ideal of service as that which exists throughout the whole organisation in this country.

The report was adopted.

A resolution increasing the capital of the company to £2,000,000 by the creation of 2,000,000 Ordinary shares of 5s. each was unanimously passed.

STANDARDISATION

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By using *standard* contacts you will save time and tooling—both of which cost you money—ensure interchangeability *and* simplify your stock problems.

Apart from this we put a very great deal of research and experience into the design of our standards, and if you will let us know your problem we will advise you on the choice of the *contact for the job.*

Send for a series of Data Sheets giving full particulars of our production of materials, components and assemblies for electrical engineering. Free on request.

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The First Contract-Built
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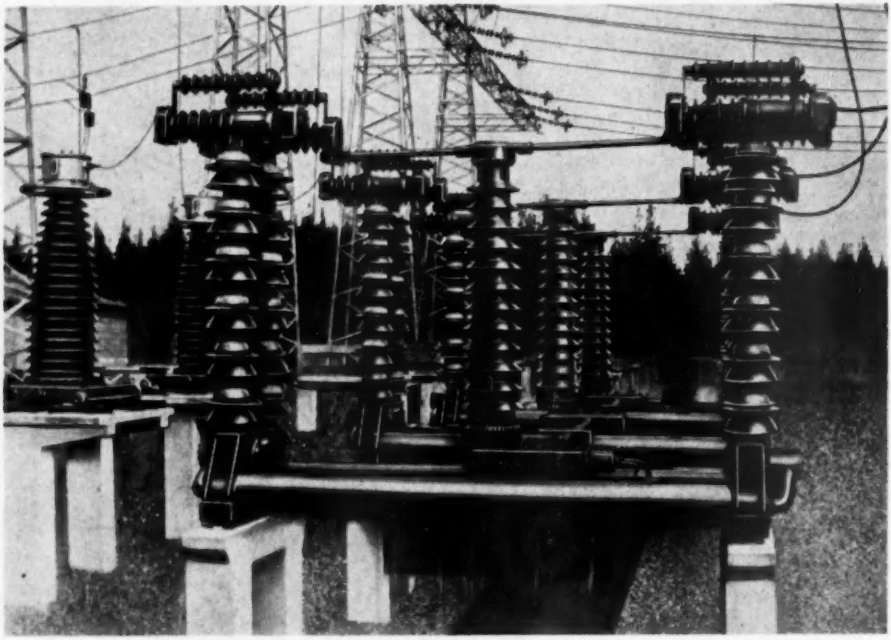

completed for Finland by METROVICK

The first British-built 220kV circuit-breakers for commercial service have now been installed in Finland by Metrovick. These circuit-breakers clear a fault within 0.07 seconds of trip impulse and are designed to reclose automatically after a "dead time" adjustable between 0.25 and 0.4 seconds. The experience gained from the manufacture and installation of these equipments has been applied to the design of circuit-breakers for 275kV and higher voltage transmission systems.

METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED, TRAFFORD PARK, MANCHESTER, 17
A member of the A.E.I. group of Companies

METROVICK *Switchgear for reliable operation*

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

CITY OF SALFORD

City Engineer's Department

TENDERS are invited by the first post, Monday, September 18, 1950, for the Electrical Installations at 4 shops, 4 maisonettes, and 259 flats at Ladywell, Eccles New Road, Salford.

Specification and tender form may be obtained on application to the City Engineer, Town Hall, Bexley Square, Salford 3.

H. H. TOMSON,
Town Clerk.
(F 664)

URBAN DISTRICT COUNCIL OF ENFIELD

PUBLIC LIGHTING, GREAT CAMBRIDGE ROAD

TENDERS are invited as follows:—

(a) From manufacturers of lanterns for the supply of 128 No. lanterns for 400-W H.P.M.V. lamps, together with lamps, control gear, and fuses.

(b) From the manufacturers of reinforced concrete columns for the supply and erection of 128 No. columns, 26 ft. mounting height, and the fixing of lanterns, etc.

Specifications, bills of quantities, and forms of tender can be obtained from the Council's Engineer and Surveyor, Mr. Frank Lee, A.M.I.C.E., 7 Little Park Gardens, Enfield, upon payment of £1 deposit in respect of either section, returnable upon receipt of a bona fide tender and/or the return of all documents. The above documents and general conditions of contract and plan can be inspected at the Engineer's office without charge during office hours (9 a.m. to 5 p.m.; Saturdays 9 a.m. to 12.30 p.m.)

Tenders must reach the undersigned not later than first post on Monday, September 11, 1950, and no tender will be received except in a plain sealed envelope, which shall be endorsed "Tender for Lighting, Great Cambridge Road, Section A (or Section B)," but shall not bear any mark or name indicating the sender.

The Council do not bind themselves to accept the lowest or any tender.

CYRIL E. C. R. PLATTEN,
Clerk of the Council.

Public Offices, Enfield.
August 15, 1950. (F 683)

COUNTY COUNCIL OF MIDDLESEX

Supplies Department

TO ELECTRIC LAMP MANUFACTURERS

TENDERS are invited from Manufacturers for the supply of Electric Lamps, for establishments in the administrative area of the County Council of Middlesex and establishments beyond the County Boundaries for a period of twelve months from November 1, 1950.

Forms of tender and specification obtainable from the Chief Supplies Officer, 25 Victoria Street (South Block), Westminster, S.W.1, or will be forwarded on receipt of stamped addressed foolscap envelope.

Sealed tenders properly endorsed must be enclosed in the special envelope provided and are to be received by the Clerk of the County Council not later than 12 noon on September 9, 1950.

The envelope shall not bear any name or mark indicating the sender and shall be endorsed " Tender for Electric Lamps."

The Council does not bind itself to accept the lowest or any tender and no allowance will be made for tenders.

C. W. RADCLIFFE,
Clerk of the County Council.

Guildhall,
Westminster, S.W.1.
14.8.50. (F 707)

COUNTY BOROUGH OF BURY

Elton County Secondary Modern School

ELECTRICAL INSTALLATION

TENDERS are invited for the Electrical Installation for lighting, power, etc., at Elton County Secondary Modern School.

General conditions, specification and drawings, may be obtained from the Borough Engineer, Town Hall, Bury, on payment of a deposit of £2/2/-, which will be returned upon the receipt of a bona fide tender.

Tenders, enclosed in the official envelope provided, should reach me not later than 10 a.m. on Monday, September 4, 1950.

EDWARD S. SMITH,
Town Clerk.

Town Hall, Bury.
August 10, 1950. (F 663)

APPOINTMENTS VACANT

SOUTHERN ELECTRICITY BOARD

No. 3 (Portsmouth) Sub-Area

ASSISTANT ENGINEERS, CHICHESTER DISTRICT

APPLICATIONS are invited for the positions of two Assistant Engineers in the Chichester District (located at Bognor) of the No. 3 (Portsmouth) Sub-Area. The provisional salaries, depending upon qualifications and experience, will be £459 and £375 respectively, subject to adjustment by the appropriate negotiating machinery, with N.J.B. conditions of service.

Candidates should have experience in the design, construction, operation, and maintenance of h.v. and l.v. overhead and underground distribution systems, substation plant, and distribution equipment, and possess suitable technical qualifications. The appointment will involve standby duties.

The successful applicants will, subject to certain conditions, be required to join the B.E.A. and Area Boards' Superannuation Scheme, membership of which is compulsory.

Applications, on forms to be obtained from the Sub-Area Secretary, should be submitted to him at Lower Drayton Lane, Cosham, Portsmouth, in envelopes endorsed "Assistant Engineer, Bognor," within 14 days of the publication of this advertisement.

F. W. KEMPTON,
Secretary.
(F 690)

MIDLANDS ELECTRICITY BOARD

Birmingham and District Sub-Area

APPOINTMENT OF DISTRICT ENGINEER

APPLICATIONS are invited for the position of District Engineer in the Birmingham and District Sub-Area.

Applicants should preferably be corporate members of the Institute of Electrical Engineers, or hold equivalent qualifications, and must have had experience in the operation and maintenance of h.v. and m.v. distribution networks and protective systems.

The conditions of service will be in accordance with the National Joint Board Agreement and the present salary that appropriate to Class "H," Grade 3, £948-£994 per annum.

Applications, giving full details of experience and qualifications, should be endorsed "District Engineer" and forwarded within 14 days to Fmil Braathen, Manager, Birmingham and District Sub-Area, 14 Dale End, Birmingham 4.

A. STEPHENS,
Secretary.
(F 694)

METROPOLITAN WATER BOARD

APPOINTMENT OF SENIOR ASSISTANT ENGINEER (ELECTRICAL)

SENIOR Assistant Engineer required on permanent staff, salary scale £800 by £25 to £900 per annum, inclusive of cost-of-living bonus. Age not over 45 years.

Applicants should be corporate members of the Institution of Electrical Engineers or the Institution of Mechanical Engineers, and have had responsible experience in the layout, specification, installation, etc. of electrical plant applicable to the pumping of water and of electric lighting, telephones and lifts. The person appointed would be required to advise on the economic purchase and operation of electrical plant and on questions of corrosion.

Modern house in good neighbourhood available, if required, at inclusive rent of £125 per annum.

Particulars of appointment and application form may be obtained from the undersigned on receipt of a stamped addressed foolscap envelope quoting reference (E.T.).

W. S. CHEVALIER,
Clerk of the Board.

Offices of the Board,
New River Head,
Rosebery Avenue, London E.C.1. (F 634)

SOUTHERN ELECTRICITY BOARD

No. 3 (Portsmouth) Sub-Area

ASSISTANT ENGINEER, PORTSMOUTH DISTRICT

APPLICATIONS are invited for the position of Assistant Engineer in the Portsmouth District of the No. 3 (Portsmouth) Sub-Area. The provisional salary will be £565 per annum, subject to adjustment by the appropriate negotiating machinery, with N.J.B. conditions of service.

Applicants should have experience in the design, construction, operation, and maintenance of h.v. and l.v. overhead and underground distribution systems, substation plant and distribution equipment, and possess suitable technical qualifications. The appointment will involve standby duties.

The successful applicant will, subject to certain conditions, be required to join the B.E.A. and Area Boards' Superannuation Scheme, membership of which is compulsory.

Applications, on forms to be obtained from the Sub-Area Secretary, should be submitted to him at Lower Drayton Lane, Cosham, Portsmouth, in envelopes endorsed "Assistant Engineer, Portsmouth," within 14 days of the publication of this advertisement.

F. W. KEMPTON,
Secretary.
(F 692)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:—

MAINTENANCE ENGINEER (MECHANICAL)
LITTLE BARFORD GENERATING STATION

Applicants must have had a sound engineering training, including manufacturing workshop experience, and be thoroughly conversant with repairs and maintenance of a large generating station. Preference will be given to applicants who are associate members of a recognised engineering institution or hold similar qualifications.

Salary in accordance with the revised N.J.B. Schedule, Grade 6, Class "C" (£707-£737 per annum).

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience, and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than August 29, 1950. Envelopes should be endorsed "Maintenance Engineer (Mechanical)—Little Barford."

W. N. C. CLINCH,
Controller.
Northmet House, Southgate, N.14. (F 659)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of DRIVER-FITTER (Shift) at the Machynlleth Power Station (Diesel).

The rate of pay will be in accordance with the National Joint Industrial Council Schedule for the Electricity Supply Industry, the present shift rate being 37.00d. per hour.

Applicants must be skilled fitters and capable of taking sole charge of complete diesel overhauls, also have had experience of diesel-driven generators.

Forms of application may be obtained from the "Divisional Secretary, British Electricity Authority, Merseyside and North Wales Division, Clarke Gardens, Woolton, Liverpool," and should be returned to him not later than Friday, September 8, 1950. (F 658)

SOUTHERN ELECTRICITY BOARD

No. 3 (Portsmouth) Sub-Area

DEMONSTRATOR, ALDERSHOT DISTRICT

APPLICATIONS are invited for the position of Demonstrator in the Aldershot District of the No. 3 (Portsmouth) Sub-Area. The salary will be in accordance with the N.J.C. Permanent Salary Agreement for Higher Clerical, Administrative, and Commercial Staff, Grade 1, commencing at £310 per annum, with N.J.C. conditions of service.

Candidates should be qualified to advise generally on the utilisation of electrical appliances, to give cookery demonstrations in showrooms and in the homes of consumers, and to assist in showroom duties. The possession of an E.A.W. Certificate or Domestic Science Diploma would be an advantage.

The successful applicant will, subject to certain conditions, be required to contribute to the staff superannuation scheme, membership of which is compulsory.

Applications, on forms to be obtained from the Sub-Area Secretary, should be submitted to him at Lower Drayton Lane, Cosham, Portsmouth, in envelopes endorsed "Demonstrator, Aldershot," not later than September 8, 1950.

F. W. KEMPTON,
Secretary.
(F 661)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the following appointments at Upper Boat Power Station, near Pontypridd, at salaries in accordance with the National Joint Board Revised Agreement:—

1. SHIFT CHARGE ENGINEER, Class "H," Grade 7 (£692-£722 per annum).

2. SHIFT CONTROL ENGINEER, Class "H," Grade 10 (£571-£597 per annum).

Applicants for both posts should preferably have served a regular apprenticeship, obtained the Higher National Certificate, and for appointment (1) had previous operational experience in a modern generating station, and (2) had previous experience in the control room of a modern station.

The appointments will be superannuable under the British Electricity Authority and Area Boards' Scheme.

Forms of application may be obtained from the Divisional Secretary at the address below, to whom completed applications should be returned not later than September 8, 1950, in sealed envelope endorsed with the appointment sought.

H. V. PUGH,
Divisional Controller.
(F 703)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the appointment of SHIFT CHARGE ENGINEER, Birchills Generating Station, Class "D," Grade 7, commencing salary £563 per annum.

Applicants should have had sound technical training and practical experience in the control and operation of steam generating plant and main switchgear, or mechanical and electrical experience in a manufacturer's works. Qualified marine engineers with electrical experience would be considered suitable.

Salary and conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Applications should be made on forms obtainable from the Divisional Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned not later than September 9, 1950.

F. W. LAWTON,
Divisional Controller.
(F 699)

LONDON TRANSPORT EXECUTIVE

APPLICATIONS are invited for the post of temporary DRAUGHTSMAN in the Plant Section of the Office of the Works Manager (Buses and Coaches), Chiswick Works. The duties will concern design and layout work in connection with electrical equipment and services for works. Applicants must have practical experience in factory electrical work and must have the ability to design power and lighting installations. Drawing office experience is essential. Possession of the National Certificate or comparable qualification would be an advantage.

Commencing salary will be according to age and experience up to £420 per annum, with additional payments for certain recognised qualifications.

The appointment is subject to medical examination. Canvassing, directly or indirectly, will disqualify.

Applications, giving full particulars of age, experience, and qualifications, should be sent within 14 days of the appearance of this advertisement, to the Staff Officer (F/EV 125), London Transport Executive, 55 Broadway, Westminster, S.W.1. For acknowledgment enclose addressed envelope. (F 695)

METROPOLITAN WATER BOARD

APPOINTMENT OF DRAUGHTSMEN (MECHANICAL AND ELECTRICAL)

DRAUGHTSMEN (Mechanical and Electrical) required on permanent staff, salary limits £455 to £590 per annum, inclusive of cost-of-living bonus, commencing and maximum salaries according to age, qualifications and experience. Age not over 45 years.

Applicants, who should preferably have served a trade apprenticeship, must have passed matriculation, general school or equivalent examination or possess a Higher National Certificate and have had subsequent experience either in the design, layout and specification of pumping machinery or of electrical plant as applied to pumping duties.

Particulars of appointment and application form may be obtained from the undersigned on receipt of a stamped addressed foolscap envelope, quoting reference (E.T.).

W. S. CHEVALIER,
Clerk of the Board.

Offices of the Board,
New River Head,
Rosebery Avenue, London E.C.1. (F 635)

SOUTHERN ELECTRICITY BOARD

No. 3 (Portsmouth) Sub-Area

PLANNING ENGINEER, BASINGSTOKE DISTRICT

APPLICATIONS are invited for the position of Planning Engineer in the Basingstoke District of the No. 3 (Portsmouth) Sub-Area. The provisional salary will be £563 per annum, subject to adjustment by the appropriate negotiating machinery, with N.J.B. conditions of service.

Candidates should have experience in and ability to prepare proposals and estimates for extensions of h.v. and l.v. networks and sub-stations, and to deal with preliminary work prior to construction. The appointment will involve standby duties.

The successful applicant will, subject to certain conditions, be required to join the B.E.A. and Area Boards' Superannuation Scheme, membership of which is compulsory.

Applications, on forms to be obtained from the Sub-Area Secretary, should be returned to him at Lower Drayton Lane, Cosham, Portsmouth, in envelopes endorsed "Planning Engineer, Basingstoke," within 14 days of the publication of this advertisement.

F. W. KEMPTON,
Secretary.
(F 691)

SOUTHERN ELECTRICITY BOARD

No. 3 (Portsmouth) Sub-Area

ASSISTANT ENGINEERS, ISLE OF WIGHT DISTRICT

APPLICATIONS are invited for the positions of two Assistant Engineers in the Isle of Wight District of the No. 3 (Portsmouth) Sub-Area. The provisional salaries, depending upon qualifications and experience, will be £524 and £375 respectively, subject to adjustment by the appropriate negotiating machinery, with N.J.B. conditions of service.

Candidates should have experience in the design, construction, operation, and maintenance of h.v. and l.v. overhead and underground distribution systems, sub-station plant and distribution equipment, and possess suitable technical qualifications. The appointment will involve standby duties.

The successful applicants will, subject to certain conditions, be required to join the B.E.A. and Area Boards' Superannuation Scheme, membership of which is compulsory.

Applications, on forms to be obtained from the Sub-Area Secretary, should be submitted to him at Lower Drayton Lane, Cosham, Portsmouth, in envelopes endorsed "Assistant Engineer, Isle of Wight," within 14 days of the publication of this advertisement.

F. W. KEMPTON,
Secretary.
(F 689)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the position of SENIOR ASSISTANT at the Shrewsbury Service Centre of the Shropshire and Herefordshire Sub-Area.

Applicants must be experienced in the sale of domestic electrical apparatus.

Salary and conditions of service will be in accordance with the National Joint Council, Grade 2, £390-£450 per annum.

The successful applicant will be required to contribute to the Board's Superannuation Scheme if eligible.

Applications, stating age, education, and experience, should be forwarded within 14 days to Mr. W. Winwood, Manager, Shropshire and Herefordshire Sub-Area, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

A. STEPHENS,
Secretary.
(F 702)

SOUTHERN ELECTRICITY BOARD

No. 3 (Portsmouth) Sub-Area

DISTRICT COMMERCIAL OFFICER, ALDERSHOT

APPLICATIONS are invited for the position of District Commercial Officer in the Aldershot District of the No. 3 (Portsmouth) Sub-Area. The provisional salary will be £700 per annum, subject to adjustment by the appropriate negotiating machinery, with conditions of service as prescribed from time to time.

Candidates must have had considerable experience in the commercial side of the electricity supply industry, especially in relation to rural development. They should possess a good knowledge of tariffs, sales, commercial statistics, electrical contracting and all aspects of consumer service.

The successful applicant will, subject to certain conditions, be required to contribute to the staff superannuation scheme, membership of which is compulsory.

Applications, on forms to be obtained from the Sub-Area Secretary, should be returned to him at Lower Drayton Lane, Cosham, Portsmouth, in envelopes endorsed "District Commercial Officer, Aldershot," within 14 days of the publication of this advertisement.

F. W. KEMPTON,
Secretary.
(F 669)

NORTH WESTERN ELECTRICITY BOARD

No. 1 Sub-Area

ASSISTANT ENGINEER, DESIGN AND PLANNING SECTION

APPLICATIONS are invited for the appointment of Assistant Engineer in the Design and Planning Section of the Technical Engineer's Department at No. 1 Sub-Area Headquarters, Town Hall, Manchester.

Candidates should hold the Higher National Certificate in Electrical Engineering or its equivalent, and corporate membership of the Institution of Electrical Engineers will be an advantage. A sound knowledge of underground cable practice is necessary and applicants must be familiar with the design of high-voltage and low-voltage power networks as used in a large industrial area. The duties will include originating and/or checking extensions of the high-voltage and low-voltage sections of the network. Some knowledge of high-voltage switchgear applications is also required, as well as ability to undertake all technical calculations relating to power networks in city areas.

The salary, which is provisional, and subject to negotiation with the appropriate body, will be £500 per annum.

Applications, stating age, training, and qualifications, present position and salary, should be received by the Sub-Area Secretary, The North Western Electricity Board, No. 1 Sub-Area, Town Hall, Manchester, P.O. Box 493, not later than Saturday, September 9, 1950.

JAMES W. CHANT,
Secretary.
(F 662)

BRITISH ELECTRICITY AUTHORITY

London Division

BOW GENERATING STATION

A VACANCY exists for a boiler house SHIFT CHARGE ENGINEER at the above generating station.

Applicants should have good technical qualifications and sound operating experience of Babcock and Wilcox boilers fired by chain grates and the usual steam and electrical ancillary plant.

Salary in accordance with Class "F," Grade 9 of the National Joint Board Schedule, plus London weighting—£564/18/- per annum.

The appointment will be subject to the provisions of the B.E.A. and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, London S.W.1, and should be received not later than September 9, 1950.

J. N. WAITE,
Divisional Controller.
(F 708)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the position of ASSISTANT SHIFT CHARGE ENGINEER at the Stuart Street Generating Station, Bradford, Manchester 11.

The salary will be in accordance with Grade 9, Class "H," of the Revised National Joint Board Schedule, i.e., £609 to £633 per annum.

Candidates should preferably have had previous experience in a generating station, and possession of technical qualifications is desirable.

Applications, stating age, qualifications, and giving full details of education, training, and experience, should be received by the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than September 2, 1950. (F 697)

BRITISH ELECTRICITY AUTHORITY

SENIOR ASSISTANT ENGINEERS

CO-ORDINATION SECTION, GENERATION CONSTRUCTION BRANCH HEADQUARTERS

APPLICATIONS are invited for the posts as Senior Assistant Engineers in the Co-ordination Section of the Generation Construction Branch at Headquarters in London.

The commencing salary for the appointments, which are superannuable, will be within the scale £912 per annum to £1,169 per annum, according to qualifications and experience, rising ultimately to a maximum of £1,285 per annum, including London allowance, in accordance with Grade 1 of Schedule "C" of the N.J.B. Agreement.

The appointments carry responsibility for headquarters co-ordination of generation construction work at a group of power stations, and duties will include visits to sites in various parts of the country.

Candidates should hold associate membership of the I.Mech.E. or the I.E.E. or equivalent qualifications and have practical site experience in the construction of a modern power station, including the handling of contracts, planning and programming and general co-ordination of the work from the inception of the scheme to the ultimate commissioning.

Applications, stating age, present salary, and full details of qualifications and experience, should be addressed to D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, so as to be received not later than September 11, 1950. Please quote reference "AE/85."

August 16, 1950. (F 700)

BRITISH ELECTRICITY AUTHORITY

London Division

SECTION ENGINEER—TRANSMISSION DEPARTMENT

APPLICATIONS are invited for this appointment from candidates with experience in the maintenance of h.v. switchgear, transformers, overhead lines and cables, and who should preferably be corporate members of the Institution of Electrical Engineers, or hold equivalent qualifications.

The salary and conditions of service will be in accordance with the Revised National Joint Board Schedule, Class "AX.EX," Grade 4, plus London allowance, the salary range being from £718/4/- to £962/17/- per annum.

The appointment will be subject to the provisions of the B.E.A. and Area Boards' Superannuation Scheme.

ASSISTANT SECTION ENGINEER—TRANSMISSION DEPARTMENT

Applications are invited for this appointment from candidates with experience in the maintenance of h.v. switchgear, transformers, overhead lines and cables, and who possess the Higher National Certificate or an equivalent qualification.

The salary and conditions of service will be in accordance with the Revised National Joint Board Schedule, Class "AX.EX," Grade 6, plus London allowance, the salary range being from £541/16/- to £764/8/- per annum.

The appointment will be subject to the provisions of the B.E.A. and Area Boards' Superannuation Scheme.

Applications for both the foregoing vacancies should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, so as to be received not later than September 9, 1950.

J. N. WAITE,
Divisional Controller.
(F 696)

SOUTHERN ELECTRICITY BOARD

No. 3 (Portsmouth) Sub-Area

ASSISTANT ENGINEERS, PORTSMOUTH DISTRICT

APPLICATIONS are invited for the positions of four Assistant Engineers in the Portsmouth District of the No. 3 (Portsmouth) Sub-Area. The provisional salary will be £775 per annum, subject to adjustment by the appropriate negotiating machinery, with N.J.B. conditions of service.

Candidates should have experience in the design, construction, operation, and maintenance of h.v. and l.v. overhead and underground distribution systems, substation plant and distribution equipment, and possess suitable technical qualifications. The appointments will involve standby duties.

The successful applicants will, subject to certain conditions, be required to join the B.E.A. and Area Boards' Superannuation Scheme, membership of which is compulsory.

Applications, on forms to be obtained from the Sub-Area Secretary, should be submitted to him at Lower Drayton Lane, Cosham, Portsmouth, in envelopes endorsed "Assistant Engineer, Portsmouth," within 14 days of the publication of this advertisement.

F. W. KEMPTON,
Secretary.
(F 693)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following positions in the Generation Construction Department at Divisional Headquarters in North London:—

(a) GRADE I DRAUGHTSMAN (ELECTRICAL)

The commencing salary will be within the range of £494-£600 per annum, plus 5 per cent. London weighting, depending upon experience and qualifications.

(b) GRADE II DRAUGHTSMAN (ELECTRICAL)

The commencing salary will be within the range of £347-£461 per annum, plus 5 per cent. London weighting, depending upon experience and qualifications.

Applicants for position (a) should possess the Higher National Certificate, and for position (b) the Ordinary National Certificate in Electrical Engineering and have a knowledge of the layout of electrical power plant, e.h.t. sub-stations and the preparation of transmission and works power systems.

The salaries are provisional and will be subject to negotiation through the medium of the appropriate negotiating body.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, experience and present position, should be sent in envelopes, endorsed with the appointment sought, to arrive not later than September 8, 1950, to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14.

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (F 711)

THE SOUTH WEST SCOTLAND ELECTRICITY BOARD

Dumfries and Galloway Sub-Area

DEMONSTRATOR

APPLICATIONS are invited for appointment as a Demonstrator in the above Sub-Area, operating from Stranraer, Wigtownshire.

Applicants must have had a good general education and the possession of a recognised diploma in domestic service and electrical housecraft will be an advantage. The person appointed will be required to give public demonstrations of cooking and of electrical apparatus, to demonstrate on consumers' premises, and advise consumers on the selection and use of electrical apparatus.

The conditions of service will be in accordance with the National Joint Council Agreement and the salary will be Grade 1, viz., £310 by £20 to £350 per annum, with increases to £390 per annum, subject to a certificate that the person is capable of undertaking all the duties of the grade.

The appointment will be subject to the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, qualifications, training, and experience, should be addressed to the undersigned to arrive not later than Tuesday, September 5, 1950.

W. H. WILLS,
Manager.

Marchmount, Dumfries.
August 18, 1950. (F 706)

SOUTH EAST SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for the position of ASSISTANT ENGINEER in the Commercial Department at Area Board Headquarters.

Applicants should have had a sound general and technical education and varied experience in the activities (including the commercial side) of an electricity supply undertaking. The salary will be in accordance with the National Joint Council Revised Agreement, Grade 5, Class "AX/BX," and will commence at a point within the range of £579 to £731 per annum, depending upon qualifications and experience. The appointment is superannuable.

Applications, giving full details of training, qualifications, experience, age, present appointment, and salary, should be submitted to the Chief Commercial Officer, South East Scotland Electricity Board, 52 Melville Street, Edinburgh, within 14 days.

THOMAS J. MULLAN,
Secretary.
(F 709)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

CHARGE-HAND required for Elgin (Morayshire) District. Applicants should be competent l.v. jointers and should preferably have experience also of overhead line work. Wages and working conditions in accordance with N.J.I.C. Agreement. A wooden house is available for immediate entry at an annual rental of £22.

Applications in writing to the Area Manager, North of Scotland Hydro-Electric Board, West Villa, Elgin, Morayshire.

A. CLERK,
Area Manager.
(F 701)

SOUTHERN ELECTRICITY BOARD

No. 3 (Portsmouth) Sub-Area

ASSISTANT DISTRICT COMMERCIAL OFFICER, ALDERSHOT

APPLICATIONS are invited for the position of Assistant District Commercial Officer in the Aldershot District of the No. 3 (Portsmouth) Sub-Area. The provisional salary will be £600 per annum, subject to adjustment by the appropriate negotiating machinery, with conditions of service as prescribed from time to time.

Candidates should have a sound knowledge of rural development and must possess a comprehensive knowledge of estimating for various types of wiring installations. They must be fully conversant with all aspects of the commercial side of the electricity supply industry.

The successful applicant will, subject to certain conditions, be required to contribute to the staff superannuation scheme, membership of which is compulsory.

Applications, on forms to be obtained from the Sub-Area Secretary, should be returned to him at Lower Drayton Lane, Cosham, Portsmouth, in envelopes endorsed "Assistant District Commercial Officer, Aldershot," within 14 days of the publication of this advertisement.

F. W. KEMPTON,
Secretary.
(F 668)

A LARGE company in North-west England expanding and re-organising switchgear department have situation for first-class SWITCHGEAR ENGINEER to take charge of switchgear development for air-break and oil-circuit breakers. This is a really good opportunity for a first-class man, will be well paid, and only men with experience will be considered.—Apply, mentioning reference 778, to Box No. 1605, Electrical Times. (F 623)

A LARGE company in North-west England expanding and re-organising switchgear department have several vacancies for good SWITCHGEAR ENGINEERS to take part in the development of air-break and oil-circuit breakers. These positions will give good scope and opportunity to experienced reliable men.—Apply, giving full details, mentioning reference 779, to Box No. 1607, Electrical Times. (F 624)

A LARGE company in North-west England expanding and re-organising switchgear department have situations vacant for first-class DESIGNERS for development of air-break and oil-circuit breakers. Good salary and opportunities for men with initiative, experience, and desire to take responsibilities.—Write, giving full information, mentioning reference 777, to Box No. 1611, Electrical Times. (F 625)

A VACANCY occurs on the technical sales side for an ELECTRICAL ENGINEER who has a thorough grounding in the theory and practice of the overhaul, redesign, and installation of industrial a.c. and d.c. rotating machines, control gear, mechanical drives arising from the above, change-over work, all kinds of cable work, etc. Diesel engine experience an advantage. Permanency. Please state age, experience, and salary required.—Fyfe, Wilson and Co., Ltd., Bishop's Stortford. (F 714)

APPLICATIONS are invited by the English Electric Co. from young ENGINEERS of graduate or Higher National Certificate standard, with completed recognised apprenticeship, for tendering and contracts departments at the company's various works handling turbines and other prime movers, electrical plant and apparatus. Selected applicants will, where necessary, be given a short course of preliminary instruction commencing early October, and will receive full pay during training. The positions are permanent and progressive and afford excellent opportunities in the field of commercial engineering. —Applications, quoting Ref. 348A, to Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, Westminster, S.W.1. (F 687)

BIRLEC LTD., industrial electric furnace manufacturers, Erdington, Birmingham 24, require ELECTRICAL ENGINEER, 20-24, with degree or equivalent qualification, and some works experience, for h.f. laboratory. Apply Birlec, Ltd., Tyburn Road, Erdington, Birmingham, 24. (F 686)

DETAIL DRAUGHTSMAN, experienced in the development of small precision mechanisms, required at once, by large, old-established firm in S.E. London. Some electrical experience preferred.—Apply, with details of experience, salary expected, to Box No. 1633, Electrical Times. (F 681)

DRAUGHTSMAN with experience of large transformer manufacture required by electrical engineering company in North-East London. Permanent position, with superannuation scheme, for suitable applicants. Good salary and working conditions. Write, stating age, experience and salary required, to Box No. 1545, Electrical Times. (F 453)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

CONTROL ENGINEERS

CONTROL ENGINEERS for network operation required by Major Oil Company in Middle East for control centre covering operation of extensive overhead and underground transmission and distribution networks up to 66 kV. Applicants must possess Ordinary or Higher National Certificate in Electrical Engineering, and must be experienced in the operation of indoor and outdoor metal-clad switchgear at all voltages, transformers and associated substation equipment. Age not over 35. Attractive salary, plus generous allowance in local currency, free passages out and home, free medical attention, kit allowance, good leave arrangements, Pension Scheme.—Write, giving personal particulars and details of qualifications and experience, quoting:

DEPARTMENT F.116 TO BOX NO. 2384 AT 191 GRESHAM HOUSE, E.C.2. (E 399p)

DRAUGHTSMEN : Senior Draughtsmen required to work in the Manchester district; experience in light mechanisms for relay and small electric equipment, knowledge of power railway equipment an advantage. —Reply, in writing, stating age, training, qualifications and salary required, marking envelopes "Power," to: Box No. 1575, Electrical Times. (F 529)

DRAUGHTSMEN. Ewbank and Partners have several vacancies for Engineering Draughtsmen, who must have experience of power station design and layout. Positions are permanent, with excellent prospects and are pensionable. Free lunches are provided and a five-day week is in operation.—Applicants, preferably aged 25-30, should write, stating age, experience, and salary required, to The Secretary, Ewbank and Partners, Ltd., Engineering Consultants, 15 Grosvenor Place, London S.W.1. (F 612)

DRAUGHTSMEN with experience in the fabrication of large steel tanks and vessels required by electrical engineering company in North-East London. Permanent position, with superannuation scheme, for suitable applicants. Good salary and working conditions.—Write, stating age, experience and salary required, to Box No. 1547, Electrical Times. (F 454)

ELECTRICAL CONTRACTS MANAGER required by important electric cable manufacturers. Applicants must be well versed in contracts estimating and be good correspondents. They must also possess high technical knowledge and have good personality. Excellent opening for suitable applicant.—Apply, stating age, experience, and salary expected, to Scottish Cables, Ltd., Renfrew. (F 665)

ELECTRICAL DRAUGHTSMAN required by a small firm of control gear manufacturers in Manchester district. Must have drawing office experience in specifications and diagrams.—Apply, stating age, experience, and salary required, to Box No. 1601, Electrical Times. (F 607)

ELECTRICAL DRAUGHTSMAN required by major oil company for service in the Middle East. Must have served five years electrical engineering apprenticeship, and have had five years D.O. experience in connection with electrical layouts of large industrial plants with underground cable networks. Should possess Higher National Certificate. Graduate or associate membership of a corporate engineering body desirable but not essential. Maximum age limit 35 years. Attractive salary plus generous allowance in local currency. Free passages out and home, free medical attention, kit allowance, good leave arrangements, Pension scheme.—Write, giving personal particulars and details of qualifications and experience, quoting Dept. F.192, to Box No. 2609, at 191 Gresham House, Old Broad Street, E.C.2. Applicants without above requirements will not be considered. (F 322)

ELECTRICAL ENGINEERS required for service in Middle East. Applicants should (*a*) possess Ordinary or Higher National Certificate and have had full apprenticeship with heavy electrical equipment manufacturers or with a large colliery or allied fully electrified industry, or (*b*) possess a degree and have had two years' technical apprenticeship with similar firm to above. In each case applicants must have had at least three years' subsequent experience on the installation and maintenance of heavy electrical equipment. Maximum age limit 35 years. Attractive salary, plus generous allowance in local currency, free passages out and home, free medical attention, kit allowance, good leave arrangements, pension scheme.—Write, giving personal particulars and details of qualifications and experience, quoting Dept. F.191, to Box No. 2593, at 191 Gresham House, E.C.2. (E 415)

EXPERIENCED condenser and feed heater DESIGNER ENGINEER or DESIGNER DRAUGHTSMAN required for turbine design department of large firm in the Midlands.—Please apply, stating experience and salary required, to Box No. 1619, Electrical Times. (F 638)

THE FORD MOTOR COMPANY LIMITED

has an immediate vacancy in their power house (present capacity equivalent to 70,000 kWs) for a

MECHANICAL MAINTENANCE ENGINEER

Applicants should have extensive maintenance experience of modern high-pressure boilers, turbines, and auxiliary power house plant.

Membership of professional institution or equivalent qualifications essential. Commencing salary £750 per annum. Successful candidate will be appointed to the company's permanent staff, with appropriate pension rights.

Applications, giving full particulars, should be made to

Ford Motor Company, Ltd., Salaried Personnel Department, Dagenham, Essex.

(F 657p)

ELECTRICAL ENGINEERS, age 26 to 33 years, with qualifications of Higher National Certificate standard and experience in manufacture, repairs, and maintenance of electrical plant, are required as inspecting engineers in areas London, Birmingham, Gloucester, Carlisle, Inverness, and Stoke. Progressive salary, commencing £450, rising to £650 per annum, and free pension. Contributory Widows and Orphans' Scheme.—Apply in own handwriting, stating age, qualifications, experience, and whether married or single by letter marked "Electrical Inspector" to Chief Engineer and General Manager, The National Boiler and General Insurance Co., Ltd., St. Mary's Parsonage, Manchester 3. (F 674)

ELECTRICAL OVERSEAS SALES MANAGER required by electric cable manufacturing company. While former experience in cable manufacturing is preferable, it is not essential subject to applicants possessing the necessary electrical technique. Applicants must, however, be well versed in foreign business and be first-class correspondents. Excellent opening for suitable applicant. —Apply, stating age, experience, and salary expected, to Scottish Cables, Ltd., Renfrew. (F 666)

ELECTRICAL TECHNICIAN required for electric cable works in South Africa. Applicants must have had former experience in the general technique required in electric cable manufacture. Preference will be given to corporate members of the I.E.E. Excellent opening for suitable applicant.—Apply, stating age, experience, and salary expected, to Scottish Cables, Ltd., Renfrew, Scotland. (F 667)

EXPERIENCED ELECTRICAL LAYOUT DRAUGHTSMEN required immediately. Knowledge of aircraft electrics preferred but not essential.—Apply, stating age and details, etc., to Staff and Labour Manager, The Bristol Aeroplane Co., Ltd., Aircraft Division, Filton House, Bristol. (F 4-8)

EXPERIENCED LINESMEN required for power line construction work in all parts of the British Isles. Rates of pay in accordance with Civil Engineering Construction Conciliation Board's agreement. Please apply in writing to Contract Department, Henley's Telegraph Works 51-53 Hatton Garden, London E.C.1, giving details of recent experience and employers. (F 574)

IMPERIAL CHEMICAL INDUSTRIES, LTD., invite applications for the position of ASSISTANT ENGINEER in the electrical section of the company's power department at Runcorn. Applicants, who should not be more than 30 years of age (or thereabouts) should hold a university degree or a Higher National Certificate in electrical engineering, should have had a good basic training in electrical practice, and some experience of the maintenance of electrical installations, plant, and equipment. The successful candidate will be required to join the company's superannuation scheme and to pass a medical examination.—Applications, stating age, qualifications, and giving full particulars of training, experience, and present position, should be sent to Staff Manager, Imperial Chemical Industries, Ltd., General Chemicals Division, Cunard Building, Liverpool 3, quoting reference EL 8. (F 678)

IMPERIAL CHEMICAL INDUSTRIES, LTD., Wilton Works, near Redcar, invite applications from JUNIOR ENGINEERS with a university degree or equivalent qualification in electrical or mechanical engineering. Preference will be given to candidates with two years' practical training.—Applications, giving full particulars of age, experience, etc., should be submitted in writing to the Staff Officer, Imperial Chemical Industries, Ltd., Wilton Works, P.O. Box 54, Middlesbrough, Yorkshire, quoting advertisement reference No. ICI X.73 d. 9.8.50. (F 654)

EXPERIENCED steam turbine TEST ENGINEER for turbine test department of large firm in the Midlands. —Please apply, stating experience and salary required, to Box No. 1617, Electrical Times. (F 637)

FOREMAN LINESMAN, fully experienced in all types of power line construction, required for South Africa. Permanent position for the right man.—Apply in writing to the Contract Department, Henley's Telegraph Works, 51-53 Hatton Garden, London E.C.1, giving full particulars of experience, recent references, and age. (F 688)

MACHINERY and general engineering. DEPARTMENTAL MANAGERS wanted. Permanent progressive position. Salary and share of profits. Excellent opportunity for persons with initiative, capable acting own responsibility.—Write, giving full particulars of past experience, to Box No. 7251, Frost-Smith Advs., 64 Finsbury Pavement, London E.C.2. (F 670)

MANUFACTURERS of electrical cooking and heating equipment require DRAUGHTSMAN for industrial design and development work, Birmingham.—Reply, stating age, experience, and salary, to Box No. 1635, Electrical Times. (F 684)

QUALIFIED ELECTRICAL ENGINEER, aged 25/35, A.M.I.E.E., A.C.G.I., Faraday House Diploma or similar qualification, with experience in planning electrical installations and able to read architects' drawing, required for an advisory post in North-east England. Salary according to age, qualifications and experience. —Write, giving details of training and experience, to Box No. 1609, Electrical Times. (F 626)

REQUIRED for Middle East, all-round ELECTRICIAN with experience in conduit, Pyrotenax and general electrical installation work, able to read drawings. Free passage out and return, free quarters, messing and medical attention. Leave granted, and monthly salary. Apply, stating age and experience. Forward copies of testimonials or state names to whom we may apply.— Reply to Box No. 1591, Electrical Times. (F 581)

SENIOR TRANSFORMER DESIGNS ENGINEER required. Must be fully experienced in transformers up to 2,500 kVA, 33 kW. Accommodation available.—Apply, Chief Transformer Engineer, London Transformer Products, Ltd., Trading Estate, Gate Road, Bridgend, Glam. (F 613)

TECHNICAL SALES ENGINEERS are required as Representatives in Lancashire and North-East areas. Applicants must have had sound technical and practical training, preferably to A.M.I.E.E. standard, and also some commercial experience. Age limit approximately 28-35. Permanent position, good pension scheme, and prospects are offered to men of keen intellect, initiative, and sense of responsibility, able to work with a minimum of direction, but backed by the resources of a large organisation throughout the electrical manufacturing industry.—Write, giving personal particulars, details of qualifications, and experience, and order of salary required, to Box No. 1637, Electrical Times. (F 685)

TEST ENCINEER required, age about 25. General electrical engineering experience N.C. standard, familiar with use of precision instruments, knowledge of radio desirable. Canteen facilities. Salary according to experience.—Write, Nevelin Electric Co., Ltd., Purley Way, Croydon. (F 671)

YOUNG ELECTRICAL ENGINEERS required by specialists in large power station equipment—boiler plants coal and ash plants, and ancillary equipment. Work involves preparation of schemes and tenders for motors, starters, switchgear, cabling and control systems. Sound technical training required. Previous experience desirable but not essential. Excellent working conditions and prospects; pension scheme in operation. Full details of age, qualifications and experience to personnel department, Simon-Carves Ltd., Stockport. (F 680)

SIMPLEX ELECTRIC CO., LTD.

Applications from I.E.S. members are invited by E.L F.A. manufacturer for the position of LIGHTING SALES ENGINEER to be based at Stoke-on-Trent or Birmingham. Write giving full details of experience and salary required to:

The Secretary,
Simplex Electric Co., Ltd.,
Broadwell, Oldbury, Birmingham.

(F 713p)

APPOINTMENTS WANTED

A SALES EXECUTIVE, known throughout the Midland counties, with practical and technical training and specialised knowledge of all forms of domestic and industrial heating and cooking, water heating, switchgear, and installation products, and for many years manager of a leading manufacturer's branch and sales organisation in that area, would be pleased to hear from anyone interested.—Box No. 1625, Electrical Times. (F 641)

FOREMAN ELECTRICIAN (37), considerable experience industrial, heavy plant, housing, theatre, large shop, overhead, underground and general works installations, planning, labour control, estimating. Free.—R. Lamberton, Alfriston, Sussex. Phone 306. (F 658)

SALES ENGINEER (35), A.M.I.E.E., requires post with scope for initiative. Midland area. Car owner.—Box No. 1541, Electrical Times. (F 441)

TWO fully experienced PLUMBER CABLE JOINTERS require employment. Willing to travel anywhere.—J. Collier, 372 Manchester Road, Stockport. P. McLoughlin, 20 Sandal Street, Bradford Road, Manchester 10. (F 710)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines). Service Electric Co., Ltd., Stanmore, Middx. (D 324)

ARMATURE ROTOR AND STATOR WINDING. We specialise in the repair and rewind of all types of electrical machines from fractional h.p. upwards. Special departments for vacuum cleaners, dryers, portable tools, etc. All work fully guaranteed.—Walter Crane, Greencoat Electrical Works, Westgate, Wakefield. Telephone 2172. (A 4)

CASTINGS, Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (F 270)

EXPORT and home enquiries welcomed for large quantities of P.V.C., T.R.S., V.I.R. ELECTRIC CABLES; guaranteed condition to B.S.S. by well-known British and American manufacturers.—Electrotherm, 444 High Road, London W.4. Telephone: Chiswick 4125. (F 584)

ZEROS REFRIGERATORS.—Complete range of repair and service now available. Equipment reconditioned to conform to pre-war manufacturers' specifications.—Time Engineers, Refrigeration Specialists, 60 Southend Road, Rainham, Essex. Tel.: Rainham 2358; or Southern Area Agency. Tel.: Springpark 4217. Electrical Spares supplied to the trade. (A 639)

WANTED

A.C./D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Phone: Chiswick 5105. (A 20)

WANTED.—D.C. and a.c. ball-bearing MOTORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 13)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady St., Bethnal Green, E.1. (A 1)

WANTED.—Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcock Water-tube Boilers for dismantling.—Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, large stocks Govt. surplus V.I.R., T.R.S., P.V.C. ELECTRIC CABLES. First-class condition by well-known makers only.—Box No. 1593, Electrical Times. (F 583)

1-500 AMP OIL IMMERSED BREAKER complete with three overloads and ammeter. Must be in good condition. Price and details to James H. Pullin & Co. Ltd., Free Wharf, Shoreham-by-Sea, Sussex. (F 679)

AGENCIES

ADVERTISERS require AREA AGENTS for an anti-glare lamp fitting for use with industrial and office lighting. This product, used extensively in Government installations during World War II, is now available to the general public.—Full details, Lighting Improvements, Ltd., 3 Cambray Place, Cheltenham. (F 675)

MANUFACTURERS' agent, with established connection, requires YOUNG ASSISTANT to call on B.E.A. and wholesalers in London and southern England. Knowledge of electric heating an advantage.—Full details to Box No. 1631, Electrical Times. (F 660)

FOR SALE

CABLES & WIRE

TELEPHONE WIRE, Don. 8, price 15s. per 56-lb. drum, containing ¼-mile twin.—Bradfords, Ramsey, Essex. (F 682)

DOMESTIC APPLIANCES

HACKNEY BOROUGH COUNCIL

OFFERS are invited for the following used equipment, which may be inspected upon application to the Hallkeeper, Town Hall, Mare Street, E.8:—

One Revo No. 319 Double Oven Cooker, 230 V; each oven 13·4kW.
One Jackson Hotplate.
One Revo R.40 Hot Cupboard.
Two Copper Urns.

Offers must be submitted in envelopes endorsed, "Offer for Equipment" to the undersigned by September 4, 1950. The Council do not bind themselves to accept the highest or any offer received.

G. L. A. DOWNING,
Borough Engineer and Surveyor and
Director of Housing Development.

Town Hall, Mare Street, E.8.
August 11, 1950. (F 672)

IMMERSION HEATERS. Grubb 2 kW and 3 kW standard voltages, all lengths, 12 in. to 36 in. Also 4 kW (non-taxable), 16 in. to 36 in. Fully guaranteed and immediate delivery. For illustrated brochure, latest lists and trade terms write distributors, John Owner and Co., Springfield Road, Birmingham 13. Tel.: Spr. 2939. (C 392)

ENGINEERING PLANT & MATERIALS

LADDERS (wooden and aluminium, all types), Trestles, Steps, Handcarts, etc., from Ramsay and Sons (Forfar) Ltd., Forfar (Tel. 172). (C 603)

WELDING PLANT. Several Motor Generator Arc Welders, single, double and multi-operator up to 600 amps, input 400/440 V, 3-phase, 50 cycles. Also several single and double operator oil cooled transformer welders. All modern units by well-known makers. Attractive prices.—Full details write: Thos. W. Ward Ltd., Albion Works, Sheffield. (E 111)

GENERATING PLANT

ALTERNATORS from stock, 400/440 V, 3-phase, 50 c/s, with Exciters and switchboards. 80 kVA "GEC" 1,000 r.p.m. 40 kW "ECC," 750 r.p.m. 28 kVA "Crom-Park," 1,500 r.p.m.—Full details, write: Thos. W. Ward Ltd., Albion Works, Sheffield. Phone 26311 (ex 347). (E 109)

DIESEL ALTERNATOR SETS in stock, standard voltages, single and three phase. Details post free on request.—Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel. 26311 (ex 347). (E 108)

ONE d.c. Generator, 440 V 80 amps. Switchgear, ammeter, voltmeter, to above.

Two 460 V d.c. Motors, one 50 h.p., one 25 h.p., together with complete switchgear.

Have been insured with Vulcan Boiler and General Insurance Co., Ltd.

All in good condition and just taken out of service to allow for changeover to a.c. current.

Details upon application. James H. Pullin and Co., Ltd., Free Wharf, Shoreham-by-Sea, Sussex, 2274 (F 712)

1 ALTERNATOR, G.E.C. 6,500 kW 0·9 power factor 6·6 kV 3-phase 50 c/s, at 500 r.p.m. Two-bearing Alternator, complete with exciter and bed plate together with panel.—Apply: C. J. Rice, 137 Mayplace Road West, Bexleyheath, Kent. Tel.: Bex. 3282. (F 494)

100-kVA MODERN DIESEL ALTERNATOR SET, comp. Vert. 6-cyl. Diesel engine direct coupled to alternator on baseplate, 400/230 V, 3-phase, 50 cycles, 4 wire. Details on request.—Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel. 26311 (ex 347). (E 112)

LIGHTING EQUIPMENT

FLUORESCENT LAMPS AND CHOKES, Neon and other special lamps, British and American. Inquiries invited.—Suplex Lamps Ltd., 239 High Holborn, London W.C.1. (F 553)

FLUORESCENT LIGHTING. Big trade reductions. 80 w. 5-ft. Trough Reflector or Batten Fitting, white stoved, with ballast 210-240 V a.c. and tube, 3 gns. nett, collected. List sent.—Malden Transformer Supplies, opp. G.P.O., George Street, Richmond, Surrey. Ric. 3519. (F 603)

FLUORESCENT SHELLS.—High quality stoved troughs 14s. 9d. Hexagon battens 17s. 6d., others pro rata. Complete fittings fully guaranteed at very competitive prices.—Cowling & Holdsworth, No. 1 Factory, Romside Trading Estate, North Street, Romford 7282. (F 63)

PURLEY CHOKES AND BALLASTS. Silent operation, excellent performance, efficient, long life, vacuum impregnated, quick delivery. Low price (e.g. Purley Queen, 80 watts, 14/6 each, less quantity and cash discounts). Quotations for export.—F. W. Blanshard, Ltd. (Dept. ET), Purley, Surrey. (E 343)

METERS

HOUSE SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 51)

MOTORS & STARTERS

A. ELECTRICAL CO.—FOR A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

A.C. and D.C. MOTORS, Alternators, Generators, Generating Sets, Transformers, Welding Equipment, Plating Plant, Control Gear, Switchgear, Portable Electric Tools, etc., etc.—Write for current electrical stock list, post free. Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel. 26311 (ex 347). (E 107)

A.C. and D.C. MOTORS, GENERATORS, from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 8831/4. (A 476)

A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel.: 7232. (A 12)

A.C. and D.C. MOTORS, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). (A 10)

BRAND new a.c. MOTORS from stock: 1/3rd to 90 h.p. slip ring and squirrel cage, 400/440 V, 3-phase, 50 cycles at 750, 1000 and 1,500 r.p.m. With or without control gear. Prompt despatch. Attractive prices. Detailed list on request.—Thos. W. Ward Ltd., Albion Works, Sheffield. Tel. 26311 (ex 347). (E 110)

FOR ELECTRIC MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (C 296)

1 SYNCHRONOUS MOTOR, G.E.C. 9,350 h.p., 6,600 V 3-phase 50 c/s, at 500 r.p.m. Complete with 2 bearings, bedplate, exciter, reactor and panel.

One 80 h.p. G.E.C. SQUIRREL CAGE BALL BEARING MOTOR, 50 c/s 3-phase 400 V 122 amp. 485 r.p.m., and starter. Complete with Visco air filtering plant and fan, or would sell separately.—Apply: C. J. Rice, 137 Mayplace Road West, Bexleyheath, Kent. Tel.: Bex. 3282. (F 493)

200 H.P. T.E.F.C. SLIP RING MOTOR, by Bruce-Peebles, 400/440 V, 3-phase, 50 cycles, 480 r.p.m. B.B. with Ellison Oil Immersed Control Gear. Details on request.—Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel. 26311 (ex 347). (E 113)

ELECTRIC MOTORS, GENERATORS, TRANSFORMERS A.C. & D.C.
STARTERS, SLIP RING & D.C., SEMI-AUTOMATIC
Any voltage, new, short delivery, all types of revolving electrical power.
ELECTROPOWER COMPANY LIMITED
Kingsbury Works, Kingsbury Road, London N.W.9.
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Full particulars of these examinations and entrance forms may be obtained from: Examinations Department, The Electrical Association for Women, 35 Grosvenor Place, London S.W.1. (F 705)

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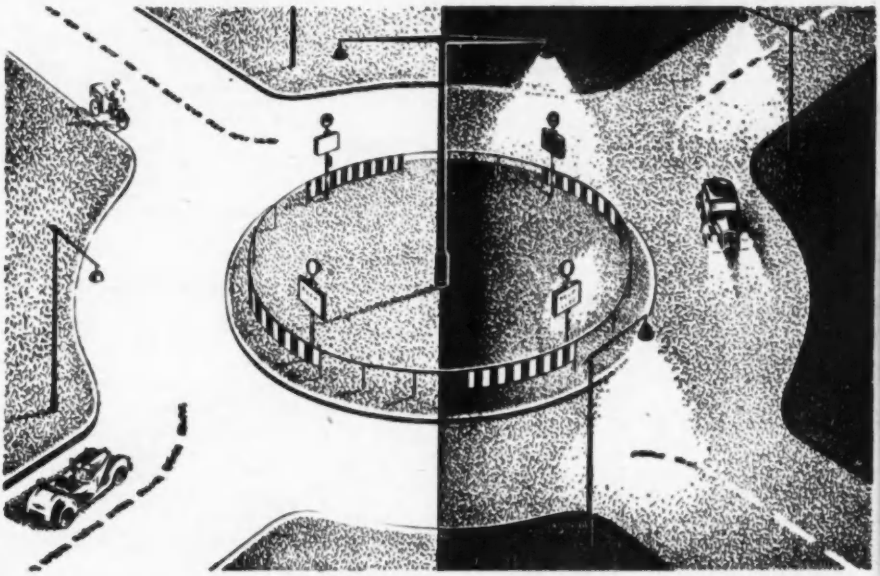

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Aerialite, Ltd. ... 79
Automatic Telephone and Electric Co., Ltd. ... 73
B.V.C. Industrial Constructions, Ltd. ... 37
Belling and Co., Ltd. ... 6
Bill Switchgear, Ltd. ... 5
Birch, H. A., and Co., Ltd. ... 21
Britannic Electric Cable and Construction Co., Ltd. ... 13
British Insulated Callender's Cables, Ltd. ... 1
British National Electrics, Ltd. ... 2
British Thomson-Houston Co., Ltd. ... 8
Brook Motors, Ltd. ... 19
Brush Electrical Engineering Co., Ltd. ... 28
Carter, B. and F. & Co., Ltd. ... 74
Clyde Blowers, Ltd. ... 76
Cressall Manufacturing Co., Ltd. ... 4
Crompton Parkinson, Ltd. ... 35, 43
Drake and Gorham Wholesale, Ltd. ... 66
Duratube and Wire, Ltd. ... 39
Electric Construction Co., Ltd. ... 75
Electropower Gears, Ltd. ... 72
Elliott Bros. (London), Ltd. ... 59
Engineering and Lighting Equipment Co., Ltd. ... 33
Essex Partners, Ltd. ... 72
Ferranti, Ltd. ... 41
Fry's Metal Foundries, Ltd. ... 46
Geipel, Wm., Ltd. ... 72
General Cable Manufacturing Co., Ltd. ... 30
General Electric Co., Ltd. ... 11, 36, 65
Griffiths, Gilbart, Lloyd and Co., Ltd. ... 18
Hackbridge and Hewittic Electric Co., Ltd. ... 12
Hague and McKenzie Ltd. ... 18
Henley's, W. T., Telegraph Works Co., Ltd. ... 7
Hoover, Ltd. ... 48
Igranic Electric Co., Ltd. ... 78
Jackson Electric Stove Co., Ltd. ... 26
Johnson, Matthey and Co., Ltd. ... 49
Johnson and Phillips, Ltd. ... 25
Lancashire Dynamo and Crypto, Ltd. ... 63
Laurence, Scott, and Electromotors, Ltd. ... 3
Lindley Thompson Transformer and Service Co., Ltd. ... 15
Litholite Insulators and St. Albans Mouldings, Ltd. ... 4
Liverpool Electric Cable Co., Ltd. ... 20
M.K. Electric, Ltd. ... 24
Marbourn, Ltd. ... 66
Mersey Cable Works, Ltd. ... 45
Metropolitan-Vickers Electrical Co., Ltd. ... 31, 50
Metway Electrical Industries, Ltd. ... 76
Nevelin Electric Co., Ltd. ... 80
New Day Electrical Accessories, Ltd. ... 62
Newton Chambers and Co., Ltd. ... 64
Parnall (Yate), Ltd. ... 17
Premier Cooler and Engineering Co., Ltd. ... 66
Premier Electric Heaters, Ltd. ... 61
Pritchett and Gold and E.P.S. Co., Ltd. ... 29
Revo Electric Co., Ltd. ... 22
Reyrolle, A., and Co., Ltd. ... 38
Riley, Robert, Ltd. ... 80
Rotunda, Ltd. ... 70
Rowlands Electrical Accessories, Ltd. ... 27
Runbaken, Ltd. ... 76
Sanders, Wm., and Co. (Wednesbury), Ltd. ... 14
Scemco, Ltd. ... 74
Service Electric Co., Ltd. ... 74
Siemens Electric Lamps and Supplies, Ltd. ... 16
Simmonds and Stokes, Ltd. ... 68
Simon-Carves, Ltd. ... 67
Simplex Electric Co., Ltd. ... 9
Sloan Electrical Co., Ltd. ... 4
S.N. Engineering Co., Ltd. ... 76
South Wales Switchgear, Ltd. ... 71
Sperryn and Co. ... 70
St. Helens Cable and Rubber Co., Ltd. ... 64
Standard Telephones and Cables, Ltd. ... 42
Statter, J. G., and Co., Ltd. ... 74
Steatite and Porcelain Products, Ltd. ... 10
Streetly Manufacturing Co., Ltd. ... 34
Superheater Co., Ltd. ... 72
Taylor, Tunnicliff and Co., Ltd. ... 40
Thorn Electrical Industries, Ltd. ... 77
Tilling-Stevens, Ltd. ... 44
Tucker, J. H., and Co., Ltd. ... 32
U.S. Metallic Packing Co., Ltd. ... 60
Vacuums, Ltd. ... 76
Whiteley, B. S. and W., Ltd. ... 23
Wilkes, J., Sons and Mapplebeck, Ltd. ... 68
Yorkshire Electric Transformer Co., Ltd. ... 69
Zenith Electric Co., Ltd. ... 60

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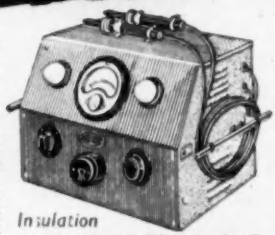

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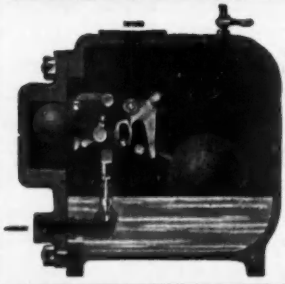

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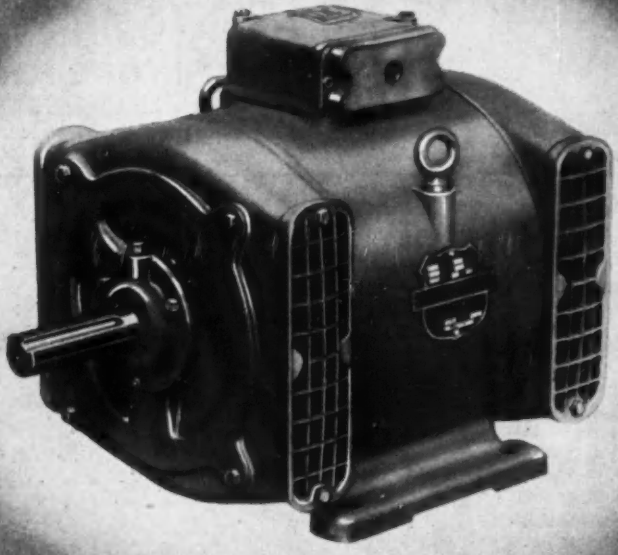

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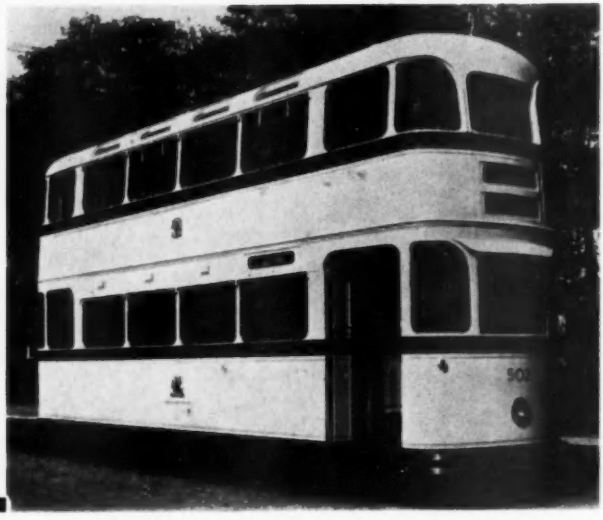

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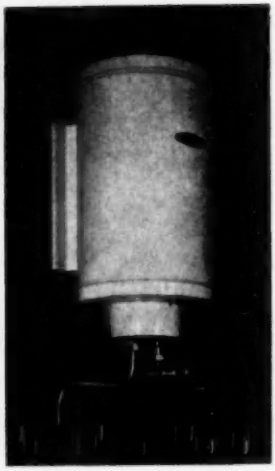

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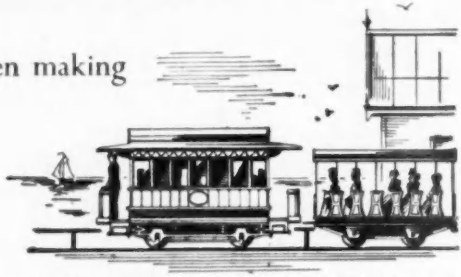
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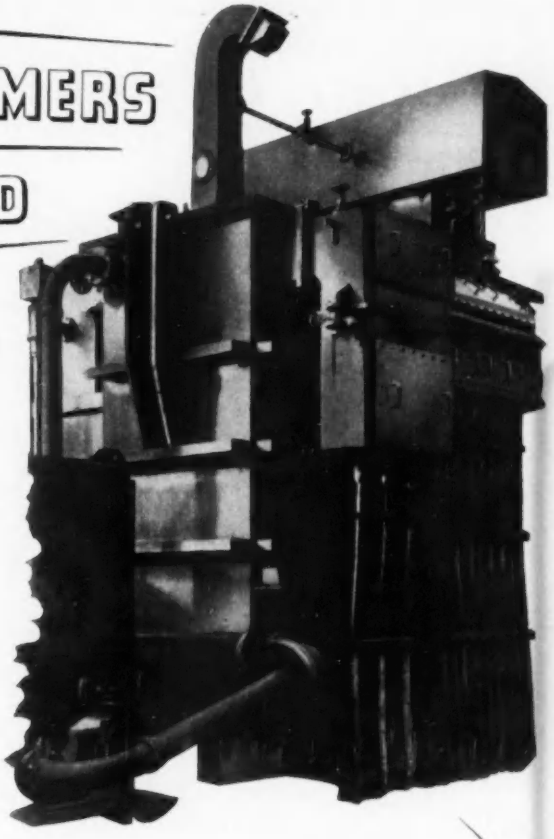

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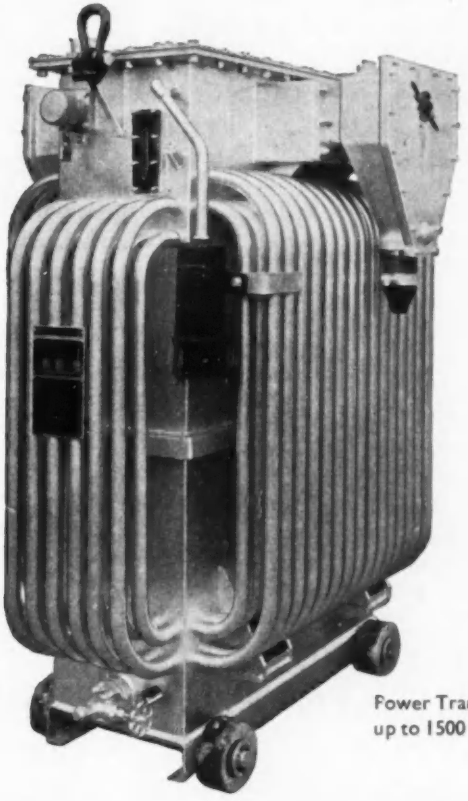

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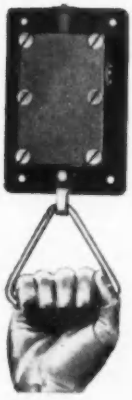

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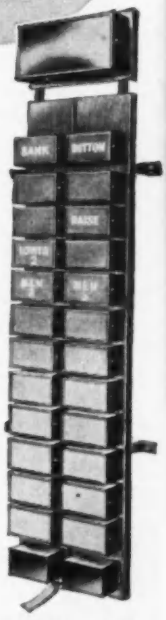

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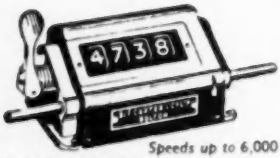

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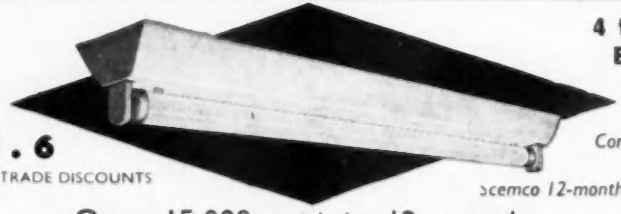

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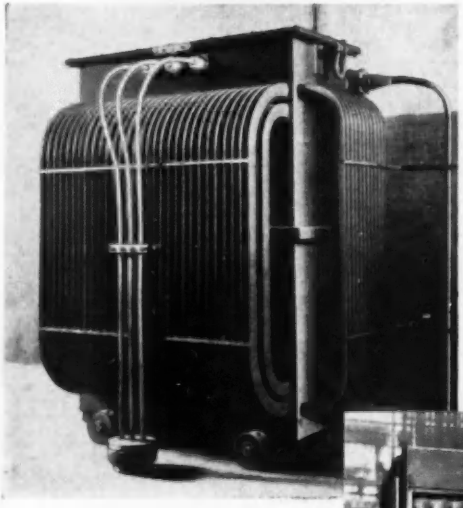

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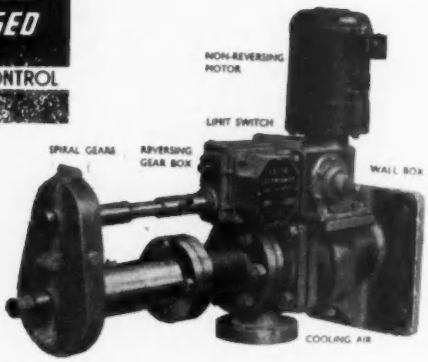

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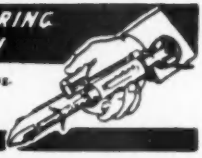

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CAMBERWELL
ART GALLERY

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To achieve uniform illumination of 15 lumens per square foot on the vertical surfaces, 16 ATLAS FH 0080 single 80 watt fittings and four FH 2030 twin 30 watt fittings were spaced 8 feet apart, 11 feet from the floor and 7 feet 6 inches from the walls. General lighting of the central area was taken care of by 7 FR 0080 translucent fittings hung from the roof beams. The Gallery's lighting was completed with 14 more FR 0080 transluscent units divided between the Water Colour and Engraver's Galleries.

This lighting scheme was installed by Messrs. A. S. Evans of Camberwell, and planned by the Illuminating Engineering Department of Thorn Electrical Industries Limited. **The Department's engineers are glad to co-operate in the planning of every type of lighting installation.**

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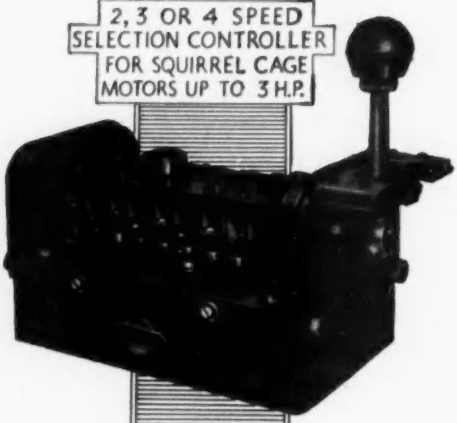

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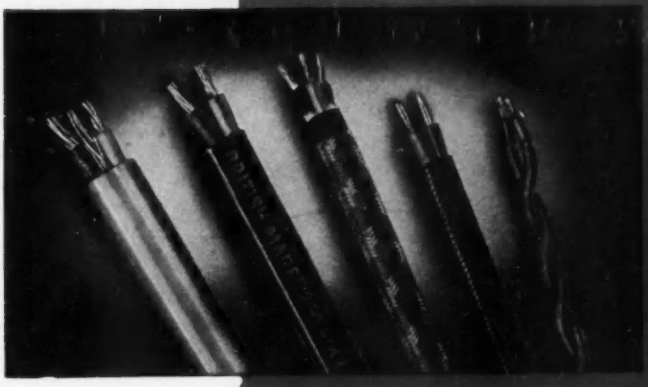

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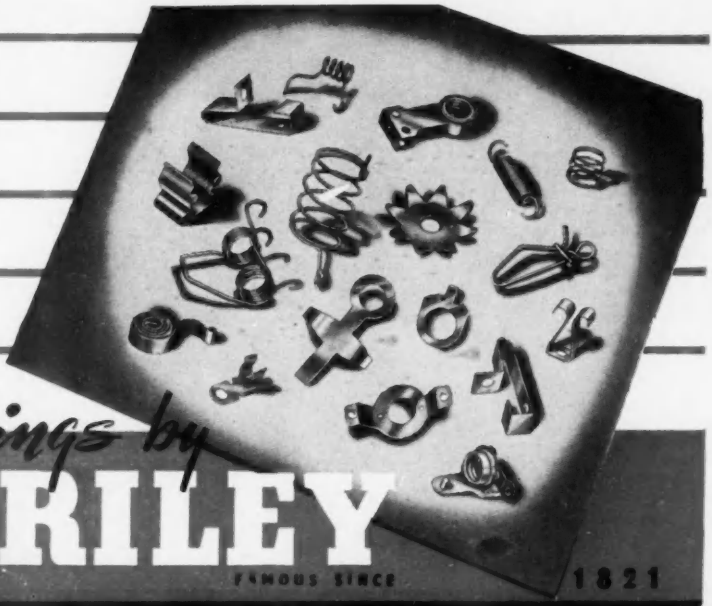

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